



SPRAY SCHEDULE FOR APPLES

As used at the Essex County Agricultural School

Time of Application	Material Used	Enemy	Remarks
(1) Delayed Dormant. Early spring as buds are breaking.	Lime-sulphur, 6 gal. in 50. 40% nicotine sulphate 3/8 pint.	Aphis, San Jose Scale, Blister Mite.	This spray has very largely superseded the dormant application.
(2) Pre-Pink. Before the clusters of blossom buds separate.	Lime-sulphur, 1 gal. in 50.	Apple Scab.	Used on McIntosh and other varieties subject to scab. Very effective.
(3) Blossom-Pink. As blossom buds begin to show pink.	Lime-sulphur, 1 gal. in 50. Arsenate of lead paste 3 lbs.; powder 1 1/2 lbs. Nicotine sulphate 1/2 pint.	Red Bug, Scab, Curculio, Aphis, Tent Caterpillar, Bud Moth, Tail Moth, Gypsy Moth, Canker Worm.	In areas where the gypsy moth is troublesome, the amount of arsenate should be doubled.
(4) Calyx. When last of petals are falling.	Same as (3).	Codling Moth, Scab, Curculio, Red Bug, Aphis, Gypsy Moth, Sooty Fungus.	Generally regarded as the most important single spray.
(5) 3 or 4 weeks after Calyx Spray.	Same of calyx spray, except no nicotine sulphate.	Same as calyx except Red Bug and Aphis.	
(6) Last of July.	Liquid lime-sulphur, 1 gal. in 50. Arsenate of lead powder, 1 1/2 lbs., paste 3 lbs.	Sooty Fungus, Scab.	If second brood of codling moth are not present, omit the lead.
(7) Middle of August into September.	Same as (6).	Sooty Fungus, Scab.	Used on McIntosh and other varieties especially subject to sooty fungus if moist foggy weather continues.



Digitized by the Internet Archive
in 2024

THE AMERICAN FRUIT CULTURIST

CONTAINING

PRACTICAL DIRECTIONS FOR THE PROPAGATION
AND CULTURE OF ALL FRUITS ADAPTED
TO THE UNITED STATES

BY

JOHN J. THOMAS

FIRST PRESIDENT OF THE FRUIT GROWERS' SOCIETY OF WESTERN NEW YORK
HONORARY MEMBER OF MASSACHUSETTS HORTICULTURAL SOCIETY; OF PENN-
SYLVANIA FRUIT GROWERS' SOCIETY; WORCESTER HORTICULTURAL So-
CIETY; ASSISTANT EDITOR "COUNTRY GENTLEMAN;" AND FOR
THIRTY YEARS A PRACTICAL NURSERYMAN.

Twenty-first Edition, Revised and Enlarged

BY

WILLIAM H. S. WOOD

LIFE MEMBER AMERICAN POMOLOGICAL SOCIETY, MEMBER NEW YORK ACADEMY OF
SCIENCES, INCORPORATOR NEW YORK BOTANICAL GARDEN, FELLOW AMERICAN
GEOGRAPHICAL SOCIETY; MEMBER HORTICULTURAL SOCIETY OF NEW
YORK; OF BEDFORD FARMERS' CLUB, ETC., ETC.

*ILLUSTRATED WITH OVER EIGHT HUNDRED
ACCURATE FIGURES*

NEW YORK
ORANGE JUDD COMPANY

1914

COPYRIGHT 1875, 1885, 1897, 1903.
By WILLIAM H. S. WOOD.

PRINTED IN U. S. A.

EDITOR'S PREFACE TO THE TWENTY-FIRST EDITION.

PROBABLY no other work of its character has enjoyed the popularity of Thomas' "American Fruit Culturist"; first published many years ago. It has, unlike most books by other authors, been revised and kept up to date, both with respect to the newer varieties of fruits and also the improvements in cultivation—in all the details, in fact, pertaining to the science and art of fruit growing. In the preparation of the present edition the editor has had the valued assistance of Prof. M. V. Slingerland of Cornell University, who wrote the chapter on Destructive Insects; of Prof. Byron S. Halsted of Rutgers College, who wrote that on Diseases of Fruits; and especially of Prof. L. H. Bailey, who supervised almost the entire book.

The editor still feels that the time has not yet come to adopt absolutely the rule of the American Pomological Society with respect to the names of fruits. To do so before the nursery-men, the dealers, much more generally conform to it could only lead, as before stated, to uncertainty and confusion. Thomas' "Fruit Culturist" has again been materially enlarged both in text and illustrations.

While it is believed that this book will be found scientifically accurate, it must be remembered that it is prepared especially as a practical working manual for the amateur and farmer.

WILLIAM H. S. WOOD.

NEW YORK, *February, 1903.*

EDITOR'S PREFACE TO TWENTIETH EDITION.

IN presenting the present edition of "Thomas' American Fruit Culturist," it seems necessary briefly to state the reasons for the numerous changes which will be found, and also to offer an apology for whatever shortcomings may be noticed. Mr. Thomas was my lifelong friend, and, when the infirmities of his later years prevented him from making the needed revision himself, he requested that I should personally undertake it. Though the cares and responsibilities of an active business life seemed to forbid so arduous a task, congenial as it was to an amateur for thirty years in horticultural work, nevertheless, the great value of the book, and its probable continued usefulness to all interested in fruit-culture in America, were so apparent, that I consented to undertake it under Mr. Thomas' supervision. Unfortunately, almost before it was begun his death deprived me of the support upon which I had so greatly calculated. The work has, therefore, been completed under disadvantages which those only who personally knew its gifted author can appreciate.

John J. Thomas, the son of David Thomas, the chief engineer in building the Erie Canal from Rochester to Buffalo, was born at Ledyard, Cayuga County, N. Y., January 8th, 1810. He was chiefly educated at home, and early developed an intense interest in natural science, especially devoting himself to botanical study. After some years spent with his father in the nursery business, he established a nursery of his own in Wayne County, and for over thirty years continued in the business, earning a reputation which placed him in the front rank as a practical pomologist and authority in everything pertaining to the propagation and raising of fruits of all kinds. He was an industrious writer, both of books and as contributor to journals. He was an associate editor of the *Country Gentleman*, from its foundation until 1894, when failing strength

prevented him from continuing his connection with that paper. On February 22d, 1895, he died. Mr. E. W. Lincoln, secretary of the Worcester County (Mass.) Horticultural Society, wrote of him: He "was ever the peer of Barry and the Downings, and survived them to take his proper place, unchallenged, at the very head of the pomologists of America."

The changes which have been made in this edition of Thomas' work are such only as seemed to confine its matter strictly to the propagation and cultivation of fruits in the open air, and to bring it in all respects fully up with our present knowledge. The few sections which treated of raising or ripening under glass, of preserving fruit, and the lists of such as could be grown only in houses, have been omitted. The selected list of fruits recommended for different parts of the United States has also been omitted, because now the agricultural experiment stations of each State afford a more reliable guide. The "Monthly Calendar of Work" has been dropped, on account of its unsuitableness for every locality.

The cultivation of fruit in California and the Pacific States is not especially treated of, there being already a voluminous work upon this subject.

On the other hand, numerous chapters have been added upon subjects which have become of practical value and of almost vital importance to the would-be successful fruit-grower.

The chapter on "Insects and Diseases" has been greatly extended, the investigations of the past ten years having added much to our knowledge upon these important topics.

The second section of the book, treating of the varieties of the "Different Kinds of Fruits," has been very thoroughly revised, and it is believed will be found to embrace practically complete descriptions of all the acknowledged standard and approved newer sorts; while the "Descriptive Index," as heretofore, includes also very many kinds now nearly or quite superseded, and others which have been so recently introduced that their real value is not yet established.

An entirely new chapter has been added on "Nuts."

The new chapter on "Wild Fruits" closes this section.

The third section has been expressly prepared for this work by Mr. E. H. Hart, of Florida, upon the recommendation of Mr.

P. J. Berckmans, of Augusta, Ga., the veteran and learned ex-president of the American Pomological Society. It covers all the sub-tropical fruits which can be successfully cultivated, save, perhaps, in the limited extreme southern part of Florida.

One of the most unsatisfactory points in connection with illustrations of fruits, wherever found, is the uncertainty as to the actual size of the variety represented, while it is pretty generally understood that the engravings in nurserymen's catalogues are usually of abnormally large specimens, and too often, especially with the smaller fruits, the same cut is made to do duty in different lists for several sorts.

In this work all illustrations of fruit are from average-sized specimens, and are life-size, unless otherwise definitely stated.

The importance of this feature in identifying varieties has been considered so great that, in certain chapters, as, for instance, that upon "Grapes" and that on "Strawberries," illustrations have been wholly omitted, from the impossibility of obtaining photographs in the time allowed me by the publishers. In future editions, it is hoped these and other omissions in the same line may be supplied.

I am indebted to Prof. L. H. Bailey, of the Cornell State Experiment Station, Ithaca, N. Y., for the chapter on "Spraying;" to Prof. J. L. Budd, of the State Experiment Station at Ames, Iowa, for descriptions of Russian apples, incorporated in the chapter on that fruit; to Mr. E. H. Hart, of Federal Point, Fla., for the entire section on "Sub-Tropical Fruits;" to the Directors of all the experiment stations of the country for their courtesy in sending me, as far as possible, complete files of their publications, of which I have made copious use, especially in the way of illustrations.

For kind permission to copy wood-cuts, I have also to thank Prof. C. C. Georgeson, of Manhattan, Kan.; and William Parry, of Parry, N. J.

I must also acknowledge my indebtedness to Mr. S. B. Heiges, pomologist of the Department of Agriculture, Washington, D. C., for courtesies received.

WILLIAM H. S. WOOD.

NEW YORK, JANUARY 2d, 1897.

PREFACE TO NINETEENTH EDITION.

THE first edition of the "Fruit Culturist," the basis of the present work, was written more than thirty years ago, and a year before the appearance of Downing's first edition of the "Fruits and Fruit-Trees of America." It was subsequently much enlarged through several revised editions. The rapid progress made of late years in the culture of fruit has required a still further revision, and the work is now brought down to the present date. Being intended as a guide to the practical cultivator, its object is to furnish useful directions in the management of the nursery, fruit-garden, and orchard, and to assist in the selection of the best varieties for cultivation. It aims to give full descriptions only of valuable and promising fruits suited to the country at large, or which may have been popular in certain districts. Many sorts, however, which are less known, or whose position or value is undetermined, and several excellent new varieties, will be found noticed in the general "Descriptive List and Index," where their leading characteristics are briefly described.

As some confusion would result from a promiscuous assemblage of all the different varieties, a systematic classification has been adopted for the principal fruits. By placing them under separate and characteristic heads, the cultivator is enabled to distinguish and remember each sort with more readiness than where all are thrown indiscriminately together. The names of those varieties which have been proved of the greatest general value, or which have received a large vote in their favor, either in particular regions or throughout the country, are distinguished by being printed in small capitals.* One of the chief points for determining the classification is the time of ripening; and the principal fruits are separated

* In this edition by an asterisk following the name. [EDITOR.]

into summer, autumn, and winter sorts. Although the periods of ripening vary several weeks in different parts of the country, these divisions of time will be sufficiently exact for general purposes.

The distinguishing characteristics of this work are the following: 1. The arrangement of the chapters. 2. The systematic classification of most of the large fruits, and more especially of the apples and pears. 3. The condensed descriptions of fruits, which have been mostly taken from the ripened specimens. 4. The copious illustrations of the various operations.

The reader will understand the comprehensive character of the "Descriptive List and Index" by referring to the note at its head.

JOHN J. THOMAS.

TABLE OF CONTENTS.

PART I.

CHAPTER I.

LEADING PRINCIPLES OF THE GROWTH OF TREES.

	PAGES
Germination—The Root—The Stem and Branches—The Process of Growing—Flowers—Species and Varieties, .	1-15

CHAPTER II.

PRODUCTION OF NEW VARIETIES.

New Varieties by Crossing,	16-21
--------------------------------------	-------

CHAPTER III.

PROPAGATION BY BUDDING AND GRAFTING, BY LAYERS AND BY CUTTINGS.

I. Cuttings. II. Layers. III. Grafting. IV. Budding—Limits of Budding and Grafting. Saving Mice-Gnawed Trees,	22-48
---	-------

CHAPTER IV.

SOIL, MANURES, SITUATION, AND ENCLOSURES.

Manures—Situation—Enclosures—Hedges,	49-59
--	-------

CHAPTER V.

TRANSPLANTING.

Laying Out Orchards—Transplanting—Distances for Planting Trees,	60-76
---	-------

CHAPTER VI.

CULTIVATION OF THE SOIL.

Renovating Old Trees—When to Manure Orchards—Arrangements to Facilitate Cultivation—The Modern Cultivation of Commercial Orchards—Fertilizers, . . .	77-89
--	-------

CHAPTER VII.

PRINCIPLES AND PRACTICE OF PRUNING.

PAGES

Pruning Young Trees at Transplanting—Pruning the Tops —Proper Time for Pruning—Pruning, as Affecting Fruitfulness—Summer Pruning—Giving Desired Form to Trees by Pruning—Pruning Nursery and Young Trees—Pruning Single Shoots—Pruning Young Apple- trees—Pyramids—Pruning Apple Orchards in Bearing —Pruning the Peach—Pruning the Cherry—Pruning the Quince—Pruning the Roots,	90—111
---	--------

CHAPTER VIII.

HAND IMPLEMENTS USED BY FRUIT GROWERS.

Knives and Saws—Fruit Pickers—Reel—Ladders—Syringes —Garden Engines—Labels,	112—121
--	---------

CHAPTER IX.

THINNING, GATHERING, KEEPING, AND MARKETING.

Thinning—Gathering—How to Pick Apples—Assorting and Packing for Market—Packing Grapes for Market—Pack- ing Strawberries and Other Small Fruits—Keeping Fruit—Keeping Grapes,	122—139
---	---------

CHAPTER X.

FRUITS TO SUPPLY A FAMILY.

Plan of a Fruit Garden—How to Obtain Fruit Quickly on New Places,	140—146
--	---------

CHAPTER XI.

MANAGEMENT OF NURSERIES.

Soils—Laying Out—Shelter—Seeds and Stocks—Planting Seeds—Cultivation—Budding and Grafting—Digging or Lifting the Trees—Packing for Transportation,	147—159
--	---------

CHAPTER XII.

DESTRUCTIVE INSECTS.

How Insects Eat—Woolly Aphis—Round-headed Apple-tree Borer—Flat-headed Apple-tree Borer—Oyster-shell	
---	--

	PAGES
Bark-louse—Scurfy Bark-louse—San José Scale—Lecanium Scales—Apple Aphis—Bud Moth—Canker-worms—Yellow-necked Apple-tree Caterpillar—Apple Maggot—Apple-worm or Codling Moth—Pear Psylla—Pear or Cherry Slug—Pear Midge—Plum Curculio—Plum Gouger—Black Peach Aphis—Peach-tree Borer—Fruit-tree Bark-beetle—Cherry Aphis—Cherry Fruit-fly—Quince Curculio—Grape Phylloxera—Grape-vine Flea Beetle—Rose Chafer—Grape-vine Leaf-hopper—Currant Borer—Imported Currant-worm—Currant Spanworm—Raspberry Cane-borer—Snowy Tree-cricket—Raspberry Saw-fly—White Grubs—Strawberry Root-louse—Strawberry-crown Borer—Strawberry Leaf-roller—Strawberry Weevil,	160-210

CHAPTER XIII.

THE DISEASES OF FRUITS.

<i>Apple</i> : Rust—Scab—Ripe Rot—Black Rot—Fire Blight—Powdery Mildew. <i>Pear</i> : Fire Blight—Leaf Blight—Scab. <i>Quince</i> : Rust—Black Rot—Fire Blight—Leaf Spot—Ripe Rot. <i>Peach</i> : Yellows—Leaf Curl—Fruit Rot—Scab. <i>Apricot</i> : Rust. <i>Plum</i> : Black Knot—Plum Pockets—Leaf Blight—Scab—Fruit Rot. <i>Cherry</i> : Black Knot—Leaf Blight—Fruit Rot—Mildew. <i>Grape</i> : Black Rot—Anthracnose—Downy Mildew—Powdery Mildew—Ripe Rot. <i>Blackberry</i> and <i>Raspberry</i> : Rust—Anthracnose. <i>Currant</i> and <i>Gooseberry</i> : Cane Blight—Anthracnose—Leaf Spot—Mildew. <i>Strawberry</i> : Leaf Spot. <i>Cranberry</i> : Scald. Root Galls,	211-241
---	---------

CHAPTER XIV.

THE SPRAYING OF FRUITS.

History and Description—The Apparatus, Materials, and Formulas—Spray Calendar,	242-259
--	---------

CHAPTER XV.

TERMS USED IN DESCRIBING FRUITS.

Growth of the Tree, Shoots, and Leaves—Form of the Fruit—Texture of Fruit—Flavor—Quality,	260-271
---	---------

CHAPTER XVI.

AGRICULTURAL EXPERIMENT STATIONS.

	PAGES
Act of 1887 Establishing—Extract from Act of 1895—List of Experiment Stations,	272-282

CHAPTER XVII.

RULES ADOPTED BY THE AMERICAN POMOLOGICAL ASSOCIATION

FOR NAMING AND DESCRIBING FRUITS,	283
---	-----

PART II.

On the Different Kinds of Fruit.

CHAPTER XVIII.

THE APPLE.

Nursery Management—Planting Orchards—Cultivation— Renovating and Pruning Old Orchards—Changes Wrought by Climate and Soil—Dwarf Apples—Age at which Apple-trees Begin to Fruit—Varieties,	287-350
--	---------

CHAPTER XIX.

THE APRICOT.

Cultivation and Soil—Varieties,	351-355
---	---------

CHAPTER XX.

THE BLACKBERRY AND DEWBERRY.

Cultivation—Covering from Cold—Varieties,	356-361
---	---------

CHAPTER XXI.

THE CHERRY.

Propagation—Soil—Dwarf Cherries—Varieties,	362-381
--	---------

CHAPTER XXII.

THE CRANBERRY.

Soil and Cultivation—Setting the Plants—Flooding—Gath- ering—Varieties,	382-385
--	---------

CHAPTER XXIII.

THE CURRANT.

Propagation—Pruning—Varieties,	PAGES 386-392
--	------------------

CHAPTER XXIV.

THE GOOSEBERRY.

Propagation and Cultivation—Varieties,	393-397
--	---------

CHAPTER XXV.

THE GRAPE.

Propagation—Grafting—Training—Transplanting—Trellis —Training on the Trellis—Modifications of Training— Spraying Grapes—Bagging Grapes—Soil for Vine- yards—Distances for Planting—Raising Grapes from Seed—Varieties,	398-427
--	---------

CHAPTER XXVI.

THE MULBERRY.

Propagation and Cultivation—Varieties,	428-430
--	---------

CHAPTER XXVII.

NECTARINES.

Cultivation—Varieties,	431-433
----------------------------------	---------

CHAPTER XXVIII.

NUTS.

Propagation — Grafting—Chestnuts—Chinquapin — Hazel- Nuts. <i>Hickories</i> : Pecans—Shellbarks. <i>Walnuts</i> : Butternuts—Black Walnuts—Persian Walnut.	434-463
--	---------

CHAPTER XXIX.

THE PEACH.

Propagation—Raising in Pots—Winter Protection—Varie- ties,	464-490
---	---------

CHAPTER XXX.

THE PEAR.

Propagation—Wintering—Budding—Dwarf Pears—Prun- ing—Dwarf Pears—Regrafting Large Pear-trees—Va- rieties,	491-544
--	---------

CHAPTER XXXI.

PLUMS.

	PAGES
Propagation—Grafting and Budding—Cultivation—Varieties,	545-579

CHAPTER XXXII.

THE QUINCE.

Propagation—Pruning—Varieties,	580-584
--	---------

CHAPTER XXXIII.

THE RASPBERRY.

Propagation—Planting for Market—Propagating by Seed—Rules for Culture—Varieties,	585-595
--	---------

CHAPTER XXXIV.

THE STRAWBERRY.

Requisites for Cultivation—Soil—Transplanting—Cultivation—Runners—Early Strawberries—Setting Out Plants—Selection of Varieties—Staminate and Pistillate Sorts—Varieties,	596-609
--	---------

CHAPTER XXXV.

WILD AND UNCLASSIFIED FRUITS.

Buffalo Berry—Eleagnus Longipes—Huckleberries—Junco Berry—Medlars—Paw-paw—Strawberry-Raspberry—Japanese Wineberry,	610-618
--	---------

PART III.

Sub-Tropical Fruits.

CHAPTER XXXVI.

CITRUS FRUITS.

<i>The Orange</i> : Evolution—Propagation—Budding and Grafting—Transplanting—Cuttings and Layers—Soil—Fertilizers—Distance of Planting—Cultivation—Pruning—Frost—Insects—Diseases—Selection of Varieties—Varieties. <i>The Lemon</i> : Cultivation—Varieties—Market-
--

ing the Orange and Lemon. <i>The Citron</i> : Cultivation	
—Varieties. <i>The Shaddock</i> : Description—Varieties.	
<i>The Lime</i> : Description—Propagation—Varieties,	621-652

CHAPTER XXXVII.

THE BANANA.

Cultivation and Propagation,	653-654
--	---------

CHAPTER XXXVIII.

THE DATE.

Cultivation,	655-657
------------------------	---------

CHAPTER XXXIX.

THE FIG.

Description—Propagation—Cultivation—Varieties,	658-664
--	---------

CHAPTER XL.

THE GUAVA.

Description—Propagation,	665-666
------------------------------------	---------

CHAPTER XLI.

THE LOQUAT.

Description—Propagation,	667-668
------------------------------------	---------

CHAPTER XLII.

THE PERSIMMON.

Cultivation—Japanese Improvements—Insect Enemies—	
Varieties,	669-677

CHAPTER XLIII.

THE PINEAPPLE.

Description—Cultivation—Propagation—Diseases—Varie-	
ties,	678-685

CHAPTER XLIV.

THE POMEGRANATE.

Description—Propagation—Varieties,	686-687
DESCRIPTIVE LIST AND INDEX OF FRUITS,	689-808
GLOSSARY,	809-814
GENERAL INDEX,	815-823

THE AMERICAN FRUIT CULTURIST.

CHAPTER I.

LEADING PRINCIPLES OF THE GROWTH OF TREES.

THE formation of a large tree from a minute seed is one of the most interesting and wonderful occurrences in nature. It is important that the fruit culturist should so understand the process as to know what will hasten it on one hand or retard it on the other. By understanding these principles, the necessary rules will be greatly simplified, and the directions rendered more clear and obvious.

GERMINATION.

The first movement of the seed towards forming a new plant is termed *germination*. After the plant is formed, and its growth is carried on through the agency of its leaves, the process is termed *vegetation*; the latter immediately following the former.

To produce germination seeds require heat, moisture, and air, but not light. It will be observed that these three requisites are present when seeds are slightly buried in moist, warm, mellow earth. Heat, although essential to all seeds, varies in the degree required by different species. The chickweed, for instance, will vegetate nearly down to the freezing-point; while tropical or hot-house plants often need a blood heat. Nearly every person has seen proofs of the necessity of moisture for the germination of seeds—indicated by the practice of watering newly-sown beds. The florist is aware that

minute seed, which cannot be planted deep, as the portulacca, must be kept moist by a thin covering or shading. It is often requisite to bury seeds to a considerable depth, in order to secure a proper degree of moisture to start them. On the other hand, they will sprout on the surface unburied, if kept constantly showered.

The third requisite, *air*, is an important one. Seeds may be kept dormant a long time by deep burying. Nurserymen have often retained the vitality of peach-stones for a year or two, by burying them a foot or more in compact earth. Other seed might doubtless be kept for a time in the same way. Planting too deep is often fatal to the success of a crop. The seeds of noxious weeds remain many years buried beneath the soil, until cultivation brings them up, mixes them with the soft mellow surface, accessible to air, when they spring up in profusion over the ground.

As a general rule, seeds germinate and grow most readily when buried to a depth of from three to five times their diameter, in soils of ordinary moisture.

In order to produce germination, moisture must find ready access to the interior of the seed. It is often excluded, if the coats have been allowed to become too dry. The thick coverings of the chestnut, horse-chestnut, and many seeds of similar character, if left a few days exposed to the air, become so hard as to prevent it. To secure success, they must be kept moist by imbedding them in moist sand, leaf-mould, or moss, from the moment they separate from the tree until planted in the earth. Apple seeds and some others, which have been allowed to become too dry, may frequently be started by scalding and then exposing them to the action of the frost; and by repeating the process several times, there is greater certainty of germinating. As the scalding and cooling must be quickly done, portions not larger than two or three pounds should be taken at a time. The object in cracking peach and plum-stones before planting, is to admit air and moisture—a process which is also hastened by subjecting them to freezing and thawing.

The Structure of the Plant or Tree.—All plants, in the first place, are manufactured or built up of innumerable little cells, sacs, or cavities. These are usually not over a five-

hundredth part of an inch in diameter, and in many plants they are still smaller. Fig. 1 exhibits a section of the wood of the maple cut across—presenting many thousands of these little vessels, only visible under a good microscope. The branch of an apple-tree, an inch in diameter, cut across, shows about one million. This cellular structure exists throughout the roots, stems, shoots, leaves, flowers, and fruit.

The cells of plants usually vary from 1-300th to 1-500th of an inch in diameter, and it is obvious that during vigorous growth the plant forms them with great rapidity. A shoot of

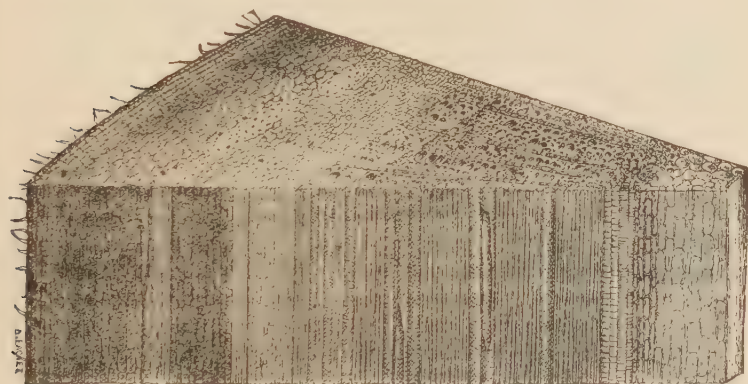


FIG. 1. —Cross Section of Tree Trunk.

asparagus increases the length of one cell every ten seconds; and as its diameter embraces many thousands, from fifty to a hundred million are formed every day. The building up of the plant of these cells has been compared to the erection of a house by the successive addition of bricks; but if as many bricks were daily added to a structure, they would be enough to make a building daily larger than the great pyramid of Egypt, or the Coliseum at Rome. Yet every one of these cells is as perfect and finished as the finest work of art.

THE ROOT.

The root consists of several parts (Fig. 2). The *main root*, called also the *tap root*, is the large central portion, extending downward. In many plants or trees, however, it is

divided as growth advances, until lost in *laterals* or side branches. The *fibres* or *rootlets* are the small thread-like roots proceeding from the laterals; and lastly, the smallest of all, the new fibres are furnished with *root-hairs*, scarcely visi-

ble without a microscope. The whole surface of roots continue to absorb moisture from the soil so long as they are fresh and new; and the newer portions, near the tips, absorb most freely. Old roots, covered with a hard or hor-

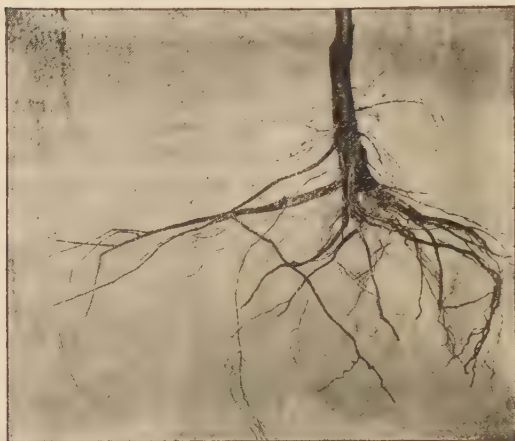


Fig. 2.—Root System of Two-year-old Apple.

ny bark, imbibe almost none. The root-hairs convey moisture into the fibres with rapidity. Young trees, when dug up for transplanting, have most of the fibres and root-hairs torn from them, and they would suffer serious injury or die, but for the power which they possess of rapidly reproducing them under favorable influences.

The *collar* is the point of union between the root and the stem, but its place may be easily changed in many young plants by banking up the stem, which will emit new roots above. Or, a branch may be buried, as in layering grapevines, honeysuckles, gooseberries, and many other woody plants. Small portions of roots attached to a graft will often produce a new plant; this is especially the case with the grape and rose, which are extensively propagated in this way; and also in some degree with the apple, of which, however, when thus root-grafted, larger portions should be employed of the roots of one-year, or at most two-year, seedlings.

THE STEM AND BRANCHES.

As roots are *annual*, *biennial*, or *perennial*, as they continue living *one, two, or more seasons*; so the stem is *herbaceous* or *woody*, as it grows only one year or more—in the latter instance hardening into wood. Woody plants, when small, are called *shrubs*, as the rose, gooseberry, and currant. When large, they are trees, as the apple, pine, and oak. A dwarf apple, made small by budding any common variety on the small Paradise stock, becomes a shrub. *Suckers* are branches springing up from underground stems; some times they come from mutilated roots. Runners are creeping stems, which strike roots at the tips and form leaves there, as in the strawberry. A single strawberry plant will in this way produce a hundred new ones or more in a summer; and by care ten thousand by the end of the second year, a million the third, and so on.

Stated in general terms the stems or trunks of hard wood trees (dicotyledons) are formed of bark, cambium layer, wood, and pith. The outer bark on some trees gradually forms into a thick, hard, corky substance, termed *cortical layers*, but while young it is the *green bark* of growing shoots. The inner layer of bark, next the cambium, is called the bast layer or *liber*, from the resemblance of the concentric plates of which it is formed to the leaves of a book.

The *cambium* layer is the active, cellular agent in the growth of the tree. It lies between the bark and wood. From its inner surface is produced the growth of wood, and from its outer the bark is formed. Thus the newest bark is inside, and the newest wood outside.

Wood.—The outer wood, which is the youngest and freshest, is called the alburnum or sap-wood. The heart-wood is the older, harder, and usually more dried portion; and it bears the same relation to the sap-wood as the cortical layers do to the liber.

The *pith*, in young plants, performs a useful office by retaining moisture; but in old trees it becomes dry, shrivelled, and useless, and trees grow as well where it has been cut out.

Branches.—These consist of *main branches*, or limbs; *secondary* or smaller branches; and *shoots*, or the extremities, being one year's growth. *Thorns* are usually a modification of

branches, and are simple, as in the common thorn; or branched, as in the honey-locust. Ungrafted pear-trees often present all the intermediate forms between perfect branches and perfect thorns. *Prickles* grow only from the bark, and when the bark is stripped off they are all taken off with it but thorns remain attached to the wood.

Buds are of two kinds, *leaf* and *flower*. The former grow into branches, the latter produce fruit. To distinguish these buds is of great importance to the cultivator of fruit-trees. Fig. 3 represents a portion of the branch of a pear-tree;



FIG. 3.

FIG. 4.

Leaf and Flower Buds. *b, b*, Flower-buds; *c, c*, leaf-buds.

b, b, b are flower or fruit-buds on the extremities of short spurs termed fruit-spurs, and *c* is a leaf-bud on a one-year's shoot. Fig. 4 exhibits these two kinds of buds as seen on the cherry, *b, b*, being the round fruit-buds, and *c, c*, the sharper leaf-buds.

Causes of this Difference.—

When young trees grow rapidly, all their buds are leaf-buds; when they become older and grow more slowly, many of them become flower or fruit buds.

One is the result of rapid and the other of slow growth. Check the growth of a young tree by transplanting it, or by root-pruning, or by neglecting cultivation, or allowing it to grow with grass, and many fruit-buds will be found upon it, and it will bear early. But as the growth is unnaturally enfeebled, the fruit is not always of the best quality. The natural diminution of vigor from increased age furnishes better fruit. Fruit-buds are likewise produced by checking the free flow of the sap in grafting on dissimilar stocks; as, for example, the pear on the quince, producing dwarf pear-trees. The fruit-spurs shown by *b*, Fig. 3, are nothing more than short shoots, originally produced from leaf-buds, but which, making little growth, have become fruit-bearers. The vigorous,

one-year shoot of the cherry, Fig. 4, is mostly supplied with leaf-buds, but the short spurs on the second year's wood, which are but dwarfed branches, are covered with fruit-buds, with only a leaf-bud in the centre.

It is not, however, always the slowest-growing kinds of fruit-trees that bear soonest. There appears to be a constitutional peculiarity, with different sorts, that controls the time of beginning to bear. The Dartlett, Julianne, and Howell pears, vigorous growers, bear much sooner than the Dix and Tyson, which are less vigorous.

By pruning away a part of the leaf-buds the fruitfulness of a tree may be increased; and by pruning away the fruit-spurs, bearing may be prevented, and more vigor thrown into the shoots.

Buds are *lateral*, when on the side of a shoot; and *terminal*, when on the end. Terminal buds are nearly always leaf-buds, and, usually being larger and stronger than others, make stronger shoots. The terminal buds are strongest, as a rule, because their leaves of the previous year were more fully exposed to air and light.

Latent Buds.—Only a small proportion of all the buds formed grow the second year; the rest remain dormant or latent for years, and are made to grow and produce shoots only when the others are destroyed. The longer a bud remains dormant, the more unlikely it is to grow. It usually dies after two or three years, leaving a ridge or crease on the bark.

Adventitious Buds are produced by some trees irregularly anywhere on the surface of the wood, especially where it has been mutilated or injured; and they form on the roots of some trees which are cut or wounded. In these cases such trees may be usually propagated by cuttings of the roots. It is usually from adventitious buds, not from dormant buds, that the shoots arise when a limb is severed. These adventitious buds do not exist in the bark, but are formed for the occasion.

Leaves.—These are commonly made up of two principal parts, viz., the *framework*, consisting of the leaf-stalk, ribs, and veins, for strengthening the leaf, and supplying it with sap; and the *green pulp*, which fills the meshes or interstices. The whole is covered with a thin skin or *epidermis*. The

green pulp consists of cells of various forms, with many air spaces between. The cells are commonly placed very compactly together on the upper side of the leaf, and more loosely, or with air-spaces, on the lower side—hence one reason that

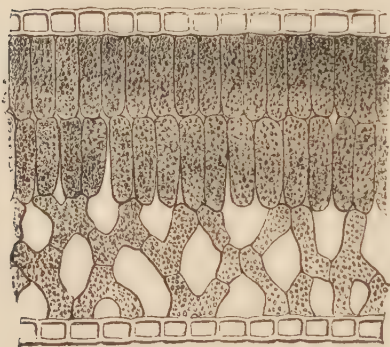


FIG. 5.

leaves are usually lighter-colored below. Fig. 5 is a highly magnified section of a leaf, showing the green cells, air-spaces, and epidermis above and below. Leaves have also *breathing pores*, through which air is absorbed, and vapor and gases are given off. They are so small as to require a good microscope to discover them; and they vary in different plants from 1,000

to 170,000 on a square inch of surface. The apple and pear have about 25,000 or 30,000, and the white lily about 60,000 to the square inch. They are mostly on the lower side of the leaf. Fig. 6 represents the pores on an apple-leaf. Leaves are a contrivance for increasing the surface exposed to the air and sun. Professor Gray says the Washington elm at Cambridge was estimated to bear "seven million leaves, exposing a surface of 200,000 square feet, or about five acres of foliage." A common fully grown apple-tree has from three to five hundred thousand leaves, and the breathing pores they all contain must be more than a thousand million.

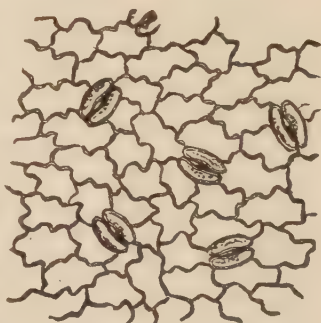


FIG. 6.

THE PROCESS OF GROWING.

Water is absorbed by the roots, carrying in weak solution many earthy salts. When it is in the plant, it is denominated

sap. It passes from cell to cell upward, through the sap-wood, until it reaches the leaves. The cells being separate, and not continuous tubes, it is conveyed from one to another through a great number of partitions; in the basswood, for example, which has very long cells, it passes about 2,000 partitions in rising a foot.

When the sap enters the leaf, it emerges from the dark cells through which it has been passing, and is spread out to the light of the sun. A large portion is evaporated through the breathing pores, and it becomes thickened. The carbonic acid of the air, under the influence of sunlight and in the presence of the leaf-green, now forms a combination with the oxygen and hydrogen of the sap, and produces the triple compound of oxygen, hydrogen, and carbon, which constitutes woody fibre—the oxygen of the carbonic acid escaping. This escape of oxygen may be seen by placing leaves under water in the sunshine. Innumerable little bubbles of oxygen form on the surface of the leaves, and give them a silvery appearance. If continued, air-bubbles rise in the water, and if a glass tumbler full of water is inverted over them, pure oxygen in small quantities may be procured. A plant growing in carbonic acid gas takes the carbon, and leaves the oxygen; in this way changing the acid to oxygen. Growing plants thus perform a most important office by purifying the atmosphere. Fires in burning, and animals in breathing, consume carbon, combine it with oxygen, and then throw off the carbonic acid thus formed. This acid, by excluding oxygen, might after a while become so abundant as to prove injurious to animal life, were it not for the wise provision by which plants consume it and restore the oxygen. Connected with this, there is another interesting proof of creative design. If there were no carbonic acid in the air, plants could not grow; but one-twenty-five-hundredth part, as now exists, supplies food for vegetation, and does not affect the health of animals and man.

Leaves require sunlight to enable them thus to decompose carbonic acid. It does not go on in a dark room, or in the night. Anything which excludes light and air tends to make the product of the plant inferior or bitter. The fruits cannot ripen fully. Their juices do not reach their full chemical maturity. Thinning and pruning are therefore important.

Hence, strawberries and other fruits are more acid when hidden by leaves or in cloudy weather; and apples on the thickly-shaded part of an unpruned tree are more sour and imperfect than where, by good pruning, the leaves which feed them are fully exposed to the light, and receive a proper share of carbon.

The sap, thickened, reduced in bulk, and containing organized matter, then descends the branches and trunk, forming a layer of fresh substance, between bark and wood, called the *cambium*—most of which constitutes a new layer of wood—a small part making a new layer of bark. The annual deposits of new wood form distinct concentric rings, by which the age of the tree may be counted when the trunk is cut through. That this is the mode by which wood in exogenous trees is deposited, may be proved by an interesting experiment, performed by slitting the bark of a young tree, lifting it up carefully, and then slipping in between wood and bark a sheet of tin-foil, and binding the bark on again. The bark will deposit

layers of wood *outside* the tin-foil, and none inside; and after a lapse of years the concentric rings will be found to correspond exactly with the time since the operation was performed.

The descent of the elaborated sap in the inner bark may be shown by tying a ligature around a growing branch, or by removing a ring of bark. The downward currents are obstructed, like that of a stream by a dam, and new material accumulates above the obstruction, and not below, as shown in Fig. 7.



FIG. 7. Effects of
a Constriction
upon the Growth
of a Sapling.

In Grafting, it is essential that some portions of the cut surfaces uniting the stock and shoot should be placed so accurately together that the sap may flow up through the alburnum or sap-wood from the stock to the shoot, and that the cambium of the shoot may grow to that of the stock. When this union takes place, the rest of the cut faces, even if some distance apart, are soon cemented by the newly-forming wood, which fills all the vacant space.

In Budding, the newly-set bud is cemented to the wood of the stock by the cambium, which hardens and fastens it. The

next spring the bud grows, forms a shoot, and the two portions become securely united by the new wood. Unless the cambium is vigorous enough to join the wood to the stock, the operation cannot succeed; and this is the reason why, with vigorously growing stocks, in which the sap is flowing freely, which are consequently rapidly forming new wood, budding succeeds better than with feeble growers, where but little of this natural cement exists.

The rapidity with which leaves exhale moisture is shown by severing them from the stem in dry weather. They soon wither and become dry. Cut a shoot from a tree, and throw it down in the sun's rays, and it will quickly shrivel, in consequence of the rapid escape of its moisture through the leaves. But first cut off all the leaves, and the shoot will remain plump a long time. This is the reason that it becomes necessary to remove the leaves at once from scions cut for budding.

Hence also the reason that plants and trees are so liable to die if transplanted with the leaves on, a disaster which may be partially prevented in trees by removing the leaves; and in plants or cuttings with leaves on, by covering them immediately with a bell-glass which, by holding the watery vapor, keeps a humid atmosphere about them. It is for this reason, also, that when young trees lose a large portion of their roots, a part of the top must be cut off, to prevent the heavy evaporation which all the leaves would occasion.

A sunflower plant, about three feet high, was found to exhale from its leaves in very dry weather between one and two pints of water in a day. A bunch of growing grass placed beneath a cool inverted glass, soon covered the sides of the glass with condensed drops from the vapor, and in a few minutes the water ran down the sides. These experiments show the great amount of water needed by growing plants; and also prove the mistake which some persons commit, by leaving weeds to grow to shade the ground and keep it moist, while these weeds are actually pumping the water rapidly up from the soil, and dissipating it through their leaves.

The absolute necessity of leaves to the growth of a tree is shown by the fact that when they are stripped off by caterpillars, the tree ceases to grow till new ones expand; and if

often repeated it perishes. When the leaves of young pear-stocks cease to act, in consequence of leaf-blight, the tree no longer grows; cambium ceases to form, and they cannot be budded. An interesting illustration of the office of leaves occurred to the writer a few years since: A yellow gage plum-tree set a heavy crop; but when the fruit was nearly grown all the leaves dropped. The fruit remained green, flavorless, and stationary, until a new crop of leaves came out. It then finished growing, acquired a golden color, and a rich, excellent flavor.

Perfect fruit requires perfect leaves; and thick, crowded, half-grown leaves give small fruit with poor flavor. The great object of pruning, and of summer pruning especially, is to give plenty of good, healthy, and not crowded foliage, and the crop will also be good.

The *green bark* of trees and plants performs an office similar to that of the leaves; and, in connection with the cells adjoining, appears to fulfil sometimes an office which the leaves fail to accomplish. This is, *perpetuating the identity of the species or variety*. For example, bud a *pear-tree* on a *quince*. All the wood above the place of union will be pear-wood; all below will be quince. All the supplies which come from the pear-leaves change to quince-wood the moment they pass this point; and if the budding is performed when the quince-stock is smaller than a quill, yet all the wood below, when it becomes a large tree, will still be perfect quince-wood, as is shown when any chance shoots or suckers spring up from below. Or bud, for example, the Northern Spy, which has dark bark, with the Bellflower, which has yellow; and again, bud the Snow-apple, which has dark-colored bark, on the Bellflower, and the light-colored Sweet Bough on this—each being an inch above the last budding. Successive dark and light bark, the peculiarity of each variety, will remain as long as the tree grows: showing conclusively that each part or twig has the power of maintaining its individuality.

FLOWERS.

The object of the flower is the production of seeds, and through them the reproduction of new plants. The protecting organs of each are, the calyx outside, which is usually, not always, green; and the *corolla*, or flower leaves, of various colors, which are next within the calyx. The essential parts of the flowers are the *stamens* and *pistils*. Fig. 8 represents an enlarged flower of the cherry, cut through the middle, showing the small calyx, the large corolla, the many stamens, and the single pistil.

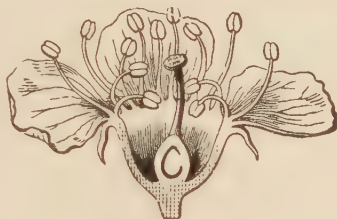


FIG. 8.—Flower of the Cherry.

Fig. 9 is a magnified flower of the purslane, showing several pistils. The head of the stamen (*b*, Fig. 10) is called

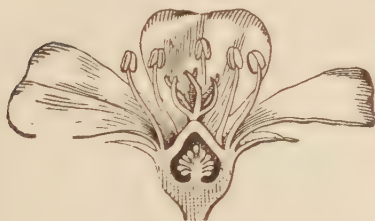


FIG. 9.—Purslane Flower.



FIG. 10.—Stamen.



FIG. 11.—Pistil.

the anther. It contains a powder called *pollen*, which is discharged by the bursting of the anther, the pollen being the fertilizing matter essential to the production and growth of the new seed. The thread-like stalk of the stamen, *a*, is called the *filament*. The pistil (Fig. 11) consists of the *stigma*, *c*, at the top; the *style*, *b*, its support; and the *ovary*, *a*, or future seed-vessel. The *ovules*, *d*, are the rudimentary seeds. The pollen of the stamens falls on the stigma, and the egg-cells are fertilized or impregnated, and seeds are the result.

Sometimes the stamens and pistils are in different flowers, on different parts of the plant. A familiar instance occurs in Indian-corn, the "silk" being the pistils, and unless these are

impregnated by the pollen of the anthers at the top, no grains of corn will be produced.

Sometimes the staminate and pistillate flowers are not only separate, but are on distinct plants, as the Buckthorn and Hemp. The pistillate flowers are said to be *fertile*, and the staminate *sterile*, and both must be planted near each other in order to obtain fruit or seed.



FIG. 12.
Staminate Flower.



FIG. 13.
Pistillate Flower.

Sometimes the stamens, when not absent, are so defective that they cannot fertilize the pistils, or but imperfectly. This is the case with some of the pistillate strawberries; such, for example, as Hovey's Seedling and the Crescent. In order to produce good crops, some other variety that has perfect flowers or perfectly-developed stamens, as the Scarlet, or Wilson, must be planted near, from which the wind may waft or the bees carry the pollen to the imperfect flowers. Fig. 12 represents the flower of a staminate strawberry, or one in which stamens as well as pistils are perfect; Fig. 13 is a pistillate flower, the stamens being small, and con-



FIG. 14.—Stamens of Scarlet Strawberry.



FIG. 15.—Stamens of Hovey's Seedling.

taining but little pollen in the anthers. Fig. 14 is an enlarged view of the former, *a* being the stamens, and *b* the pistils. Fig. 15 is a flower of Hovey's Seedling showing at *a* the dwarfed and useless stamens. Sometimes very favorable circumstances will enable these dwarfs to afford a portion of pollen, and berries will be produced. Some pistillate varieties are destitute of stamens.

SPECIES AND VARIETIES.

Plants and animals of one species are supposed never to produce a progeny of a different one, no matter how many

successive generations may intervene. Thus, for example, the seed of a pear never produces an apple, these being distinct *species*; but it gives many different sorts of pears, which are only *varieties*. So the apple produces innumerable varieties, but it can never yield a pear, a quince, or a peach.

The knowledge of the character of species, and their affinities, would frequently prevent the blunders which grafters commit, in trying to make the peach grow on the willow or butternut.

While species reproduce the same species, varieties do not always reproduce themselves. Varieties have been called incipient species. By slow and gradual changes, varieties may in time give rise to other species. So it happens that whereas the species may not directly change into another species, it may gradually pass into another by successive variations. But in the lifetime of a man, specific limits are rarely overpassed.

CHAPTER II.

PRODUCTION OF NEW VARIETIES.

THE tendency is more or less common with all plants, when successively produced from seed, to depart from the character first stamped upon them. These departures give rise to new varieties. This tendency to vary is increased as plants are removed from their native localities; and in an eminent degree by cultivation. Planted in gardens, and subjected to high culture, repeated and successive sowings often develop striking changes in those which for previous centuries had remained unchanged. By a constant selection of seeds from the best, a gradual improvement on the original is effected. Most of our finest fruits doubtless owe their existence to this improving process.

While a few of the seedlings from such improved varieties may become still further improved, a far greater number will probably approach toward the original or wild state. The more highly improved the fruit, the greater the difficulty to find one of its progeny which shall excel or equal the parent. In ten thousand seedlings from those high-flavored apples, the *Swaar* and *Esopus Spitzenberg*, it may be quite doubtful if any shall equal in quality those fruits themselves, while most may fall considerably below them.

The improvements effected in former ages were doubtless the result of accident, as the ancients were ignorant of the means for their systematic accomplishment. The greatest progress in the art made in modern times was effected by *Van Mons* in Belgium and *Knight* in England.

Van Mons, who directed his labors chiefly to the pear, obtained many new and excellent varieties, by a constant and successive selection of the best seedlings. He first made a large collection of natural stocks, or wild pears, choosing

those which, from the appearance of the wood and leaf, he had reason to believe would be most likely to give the best fruit. As soon as the first of these bore, he selected the best, and planted the seeds. Selections were again made from the first of these, and so on in continued succession, the best and soonest in bearing were uniformly chosen. He thus obtained fruit from the eighth generation; each successive experiment yielding an improved result on the preceding. He had, in the early part of this series of experiments, no less than eighty thousand trees; hence, in selecting from so large a number, his chance for fine sorts was far greater than from a small collection; and hence too the reason why, after seven or eight improving generations, he had obtained so many good varieties. In the early stages of his operations, he found "that twelve or fifteen years was the mean term of time from the moment of planting the first seed of an ancient variety of the domestic pear, to the first fructification of the trees which sprang from them." When his seedlings were at the age of three or four years, he was able to judge of their appearances though they had not as yet borne; such only were taken for further trial as exhibited the strongest probability of excellence. It is hardly necessary to remark that in all these trials the young trees were kept in the highest state of cultivation.

Van Mons maintained that by selecting and planting the seeds of the first crop on the young tree, the product would be less liable to turn back to the original variety than where the seeds were taken from the fruit of an old-bearing or grafted tree; and to this practice he chiefly ascribed his success. The many instances, however, of fine seedlings from old grafted sorts throw a shade of doubt over this theory. There is scarcely a question that the same extent of labor expended in crossing varieties would have given greater success.

NEW VARIETIES BY CROSSING.

New varieties are produced in crossing by pollinating the stigma of one with the pollen from another, as described in the preceding chapter. The simplest instance which occurs is that of the strawberry, the pistillate varieties of which

must always be impregnated with pollen from staminate sorts. Thus the seed obtained from the berries of every pistillate strawberry are crosses, and if planted will produce new varieties. In fruit-trees, the stamens and pistils are in the same flower, but these two sets of organs often mature at different times. Crossing is mostly effected by insects, which, becoming thickly dusted with powder from one flower, plunge into the recesses of another, and effect a cross-pollination. Where many varieties grow in one garden, in close proximity, cases of promiscuous intermixture are constantly occurring. The crosses thus produced are shown usually only by raising fruit from the seedlings.

In the annexed figure of the pear-blossom (Fig. 16), the five



FIG. 16.—Flower of the Pear.
a, Stigma; b, anthers.



FIG. 17.—The anthers cut out. This should be done in the bud.

central organs *a* are the *pistils*; the upper extremity of each is the *stigma*. The surrounding thread-like organs, *b*, are the *stamens*, surmounted by the *anthers*. When the flowers open, the anthers burst, and discharge the pollen which may fall on the stigmas or be carried to the stigmas of another flower.

The production of new varieties is greatly facilitated by cross-impregnation, or by fertilizing the pistil of one variety with the pollen of another. This was performed with great success by Knight. Selecting two varieties before the flowers had opened, and before the anthers had burst and discharged the pollen, he cut out with a fine pair of scissors all the stamens, leaving the pistils untouched (Fig. 17). When the stigma became sufficiently mature, which was indicated by its glutinous surface, he transferred the pollen of the other sort on the point of a camel's hair pencil. Some propagators prefer the point of a knife for applying the pollen. The fruit, thus yielded, was unchanged; but its *seeds* partook variously

of the nature of both parents, and the trees growing from them bore new and intermediate varieties.

For the success of such experiments, several precautions are requisite. The flower must be deprived of its stamens before it has fully expanded, or before the anthers have already burst and scattered their dust; the pollen must be procured from a bursting or fully matured anther, when it will be dry and powdery; the stigma must be inoculated as soon as it becomes adhesive or glutinous, otherwise it may be fertilized from another source, and then the intended pollen cannot possibly take effect. For a stigma once inoculated cannot be inoculated again. It is safest, where practicable, to force the trees by artificial heat into flowering a few days earlier than others, so as to be secure from accidental inoculations of pollen floating in the air; and to prevent its spread by bees, to apply a temporary covering of gauze, or thin oil-cloth. A want of attention to these minutiae has led some experimenters to fancy they had obtained crosses, when they had only natural seedlings.

To obtain new varieties of certain desired qualities, select two which possess those qualities separately, and seedlings from crossing will be likely to exhibit these qualities combined. Thus, a very early pear deficient in flavor, as the *Amire Joannet*, might furnish one of superior quality by a cross with a better and later sort, as *Dearborn's Seedling*. Or, a small and very rich pear, as the *Seckel*, might give us one of the larger size by fertilizing the *Bartlett*. A slow-growing and tender peach, as the *Early Anne*, might be rendered hardier and more vigorous by an intermixture with the *Early York* or *Coolidge's Favorite*. But it must be remembered, that there is a tendency in such highly improved sorts to deteriorate, and that out of thousands of seedlings, perhaps only one or two may be fully equal to the original.

The following mode of raising crosses of the grape is described by G. W. Campbell, who has experimented largely:

"To be certain of success, the grape blossom must be opened artificially, before its natural period of flowering, and all the anthers or stamens removed before the pollen or fecundating dust is formed, leaving the bare germ, with the

stigma unfertilized. To prevent the possibilities of impregnation by bees or insects, or the wind conveying pollen from other sources, the prepared blossom-bunch is inclosed in a tight, oil-silk case, and pollen supplied at the proper time from whatever variety it is proposed to cross, or hybridize with. When the berries swell, and commence growing, it is an indication that the process has been successful; and the oil-silk covering may then be removed, the bunch carefully labelled, and the seeds from these berries, when planted, are expected to produce crosses or hybrids having characteristics of both parents.

"I have also tested the accuracy of my experiments in various ways. In one instance I prepared a bunch, as if for crossing, by removing all the stamens, and inclosed it in the usual manner, but applied no pollen. Upon removing the covering some days after, every berry but one had blasted, and fell off at a touch. This one berry, being from some cause later than the rest, was just in condition to receive pollen, which I supplied from the Chasselas Musqué, and produced a grape, from which I have a seedling that may prove valuable. Other bunches, prepared at the same time, upon the same vine, and supplied with pollen at the proper time, were all fertilized, and produced full and perfect bunches. The Logan and Taylor's Bullitt both set their fruit unevenly and imperfectly, and produce usually small, straggling, and unhandsome bunches. When fertilized in the manner above stated they have produced handsome and compact bunches, the only ones of that character upon the vines.

"Seedlings almost uniformly indicate their parentage by their foliage. That of hybrids with the foreign vines is usually deeply lobed; often having much more the form of the foreign than the native leaf, although grown from the seed of the native parent. Some have foliage intermediate or resembling both in some degree. Also, in the crosses between natives, some resemble one parent and some the other. Others again seem a mixture of both."

An easier process is to plant them in close contact, so that the fruiting branches may intermingle. Out of a large number of seedlings thus obtained, there is a chance of a fair portion of them being crosses. It was in this way that Dr. Kirt-

land produced the seed of all his new and excellent varieties of the cherry.

The interesting fact that fruit trees which grow alone and distant from any other sorts are more apt to reproduce these sorts from seed with but little variation, than seeds from the same sorts in mixed orchards, shows to what extent the spontaneous crossing or mixture of varieties may be constantly going on in such orchards.

When a cross is obtained between two different *species*, instead of between mere varieties, it is termed a *hybrid*. But while varieties of the same species intermingle freely, the operation rarely succeeds between fruits of different species. The gooseberry, currant, and black currant, species of the same genus, and nearly related, have never produced a useful hybrid. Neither has any ever been obtained between the apple and the pear, or the pear and the quince. But different species of other plants, as the Heaths, and some of the Cacti, intermingle freely. Hybrids are frequently sterile; or if they possess the power of reproduction by seed, the progeny often returns to the state of one or the other of its parents.

Amongst common fruits, there are some undoubted hybrids. Such are the Kieffer and LeConte types of pears, which are hybrids between the common pear (*Pyrus communis*) and the oriental pear (*Pyrus Sinensis*).

There are many hybrid grapes, and some of them, as Agawam, Salem, and others, are of commercial importance. There is a large class of hybrid raspberries (*Rubus occidentalis* × *R. strigosus*), represented by the Shaffer and other Purple Canes. The Wilson Early blackberry is a hybrid of the blackberry (*Rubus nigrobaccus*) and the dewberry (*R. villosus*). In general, however, less is to be expected from hybrids than from the selected progeny of crosses between varieties. As a matter of fact, most varieties of fruits are chance seedlings, no one knowing their exact parentage. Amongst fruits, purposeful plant-breeding has yet played a very small role. (See Bailey, "Plant-Breeding.")

CHAPTER III.

PROPAGATION BY BUDDING AND GRAFTING, BY LAYERS AND BY CUTTINGS.

WHEN trees are raised from seeds, as before stated, there is no certainty that the same identical variety will be reproduced. In many cases, the shade of variation will be scarcely perceptible; in others, it will be wide and distinct. It hence becomes desirable in preventing a return toward the original wild state, or, in other words, to perpetuate the identical individual thus highly improved, to adopt some other mode of propagation, for the purpose of multiplying trees of such varieties as possess a high excellence, instead of constantly creating new ones, with the hazard of most of them proving worthless.

It will be distinctly remembered that new varieties nearly always spring from seeds; but the same individual variety can be multiplied only by separating the buds, or shoots bearing the buds, of such individual plant. As an example, the Fall Pippin, when first produced from seed, was a single tree of a new variety. The myriads of Fall Pippin trees now existing are only multiplications of the branches of the original. This multiplication or propagation of varieties is effected in several ways: 1, by Cuttings; 2, Layers; 3, Grafting; 4, Budding. Without these means of propagation, such delicious sorts as the Green Gage plum, the Elton cherry, and the Seckel pear, could never have been tasted except as picked from the single parent tree.

In the multitude of different modes of grafting and budding, success must depend on the observance of certain fundamental principles; a brief recapitulation, in part, of some of these laid down in the second chapter may not be out of place.

During the growing season of a fruit-tree, the sap enters at the fibrous roots, passes up through the alburnum or sap-wood, ascends to the extremities of the branches, and is distributed through the leaves. Emerging thus from the dark and minute vessels of the wood, it is spread out and exposed to the action of the light. It now becomes essentially changed in character, enters into new combinations, and is charged with the materials for the newly forming wood; it is distributed, not



FIG. 18.

FIG. 19. FIG. 20.

FIG. 21.

FIG. 22.

The Downward Flow of Sap, Causing Swellings, Callus, and Roots.

through the sap-wood, but through the inner or living bark, and building up the new plant tissues. This new layer being soft and fresh, interposed between them, causes that separation known as the *peeling* of the bark.

The sap is capable of moving sidewise, laterally through the various vessels or microscopic tubes. Hence some trees may be cut at one point more than half through on one side, and at another point more than half through on the other side, without intercepting the upward flow of sap, as in Fig. 18. The lateral motion explains the reason why a graft set in the longitudinal cleft of a stock receives the sap from the split surfaces of the cleft, and succeeds as well as when cross sections of both are brought into contact.

I. CUTTINGS.

When a ligature is bound closely round a branch, the obstruction which it imposes to the descending juices causes an enlargement or swollen ring above the ligature, as in Fig. 19. The same result is produced if a small ring of bark is cut out, as in Fig. 20. If a shoot is taken from the tree before the leaves expand, and plunged into moist earth till it commences growth, the elaborated materials build up at the lower extremity a *callus* or ring, as in Fig. 21; and under favorable circumstances, roots will form above or near this callus (Fig. 22), and thus a new plant is formed.

Every leaf-bud on a fruit-tree may be regarded as an embryo branch, and capable of forming a tree when supplied with separate roots. But single buds do not contain within themselves sufficient nutriment to sustain vegetation till roots are formed, without a considerable portion of the sap-wood and cambium layer attached; hence the superior advantage of taking an entire shoot or cutting.

Propagation by cuttings is the simplest mode of multiplying a variety. It consists in the insertion of a shoot of one year's growth into the soil; the moisture of the soil renews the supply of sap, the buds swell, the leaves expand, and the descending juices extend themselves in the production of new roots, which shoot downward into the soil, Fig. 23.

Under ordinary circumstances, or in open ground, this mode is only applicable to such species as readily throw out roots, as the currant, gooseberry, quince, and grape. Cuttings of the apple and pear can only be made to strike root in the Northern and Middle States by confining the moisture under glass, while artificial heat is applied.

It may be stated, in general, that cuttings made of the ripened wood of such trees as have a large pith succeed best when taken off with a portion of the preceding year's wood,



FIG. 23.—Rooted Cutting.

such as the gooseberry, currant, vine, fig, etc. With large and strong shoots, the best success may result if cuttings are separated at the point between the one and two year's growth. When small side-shoots are used, they should be cut closely to the main stem, so as to secure the *collar* or enlarged portion of the wood at the base of the shoot, Fig. 24. Roots are more readily thrown out, if the cut is made immediately below a bud.



FIG. 24.—
Cutting.

The best time to take off cuttings, in ordinary cases, is in autumn and winter. The autumn is preferable, by giving time for the wounded section to callus, preparing it for the early emission of roots in spring. But where the soil is heavy or liable to heave by frost, or where the cuttings are of tender trees, they should be kept in damp earth in a cellar, to be planted as soon as the frost disappears from the ground. If not taken off till spring, the operation must be performed as early as possible. In ordinary instances, to prevent drying, about two-thirds or three-quarters of the shoot should be buried beneath the surface; and the moisture may be still further retained by a covering of manure, leaves, or moss, or by placing them under the shade of a wall or close fence. When long, like the grape, they should be placed sloping, so as not to be buried too deep or beyond the influence of the sun's warmth. Failure often results from a neglect to press the soil closely about the cutting.

To procure young plants of the gooseberry and currant with straight, clean stems at the surface, and free from suckers, it is only necessary to remove every bud except a few at the upper end, Fig. 25. The length may be from eight inches to a foot.



FIG. 25.—Cut-
ting of Cur-
rant.

There are many plants easily propagated by cuttings, if the two great requisites of vegetation, namely, moisture and warmth, are increased by artificial means, as in a hotbed under glass; or in a propagating-house, under sash, or bell-glasses, with artificial heat gently applied beneath.

II. LAYERS.

A **layer** is a low side-shoot bent down and buried at the middle in the soil, Fig. 26. The buried portion strikes root, when it is taken off and planted separately. Its advantages over a cutting is, that it is nourished by the parent plant while the roots are forming. Hence many plants which cannot be increased by cuttings, and indeed with great difficulty by budding and grafting, may be propagated readily by layers.

When roots are freely emitted, as from the grape, simply bending the middle of the branch into the soil is enough to



FIG. 26.—Layering.



FIG. 27.—Slitting layers.

insure success. But in cases of difficulty, other expedients are resorted to; one of the most common is to split a portion upward, immediately under a bud (Fig. 27), which enables the newly forming roots to pass freely and at once into the soil without the resistance of the thick bark which they otherwise must pierce. Sometimes the branch is cut partly off to intercept the downward passage of the fluids, and induce the formation of roots. At other times a wire ligature, or the removal of a narrow ring of bark, effects the same purpose. Burying the layer several inches under the surface is necessary, to keep it in moist earth; and in drouth, mulching would be beneficial. A small excavation of the soil at the spot is convenient; and when the branch is stiff, it must be fastened down with a forked stick.

The excavation should be made with a spade. Use both hands in bending the shoot, so that it may not be bent too short and break. If properly done, it will press against the

nearest side of the hole, rest on the bottom, and rise up, pressing against the opposite side, when it should be fastened *upright*, and, if necessary, to a small stake. At the time of bending, a sod or other weight may be laid on to keep it down till the hole is filled; and if the mellow earth be pressed firmly down with the foot, no forked stick will be usually necessary.

The most favorable state of a plant for layering is when the bark is somewhat soft and not too ripe, and the worst shoots are those which are stunted, and with a hard bark. There are, however, no shoots whatever, not actually diseased, that will not root by layers, if sufficient time be given. Layers, like cuttings, may be made of the ripened wood in autumn or spring; or of the growing wood at or a little before midsummer, when the part intended to root is somewhat mature and firm in texture. The pear, the apple, and the quince, if layered early in the spring, or the grape in summer, will usually be well rooted in autumn.

A moist season is the most favorable to the rooting of layers, by preserving a softer bark. For this reason, many plants may be more easily propagated in England than in the United States; and more readily in Ireland than in England.

Layering is largely made use of for propagating the grape, occasionally for the quince, and sometimes for the apple. It is also of very extensive application in propagating many ornamental trees and shrubs.

Suckers may be regarded as spontaneous layers, the new shoots being sent up from buds on the roots or portions of the stem beneath the surface of the ground. They are much employed in multiplying most species of the raspberry. The runners of strawberries may be regarded as layers or suckers above ground.

III. GRAFTING.

Upwards of twenty different modifications of grafting were mentioned by the ancient Roman writer, Varro; and Thouin, of Paris, has described and figured more than a hundred kinds. The great number of modes given in books has tended rather to bewilder than to enlighten beginners; the following

remarks, therefore, are more for the purpose of laying down *reasons* on which success depends, than for pointing out the peculiar modes of operation, which may be varied according to convenience, provided attention is given to the essential particulars

Propagation by grafting differs mainly and essentially from increasing by cuttings, by inserting the cutting into the growing stock of another tree instead of directly into the soil. The stock thus supplies the sap, as the soil does in the case of a cutting; and the graft, instead of making roots of its own, becomes firmly united with the stock by means of the new-growing wood. Hence there are two chief requisites for success: the first, that the graft be so set in the stock, that the

sap may flow upward without interruption; and the second, that the forming-wood may extend

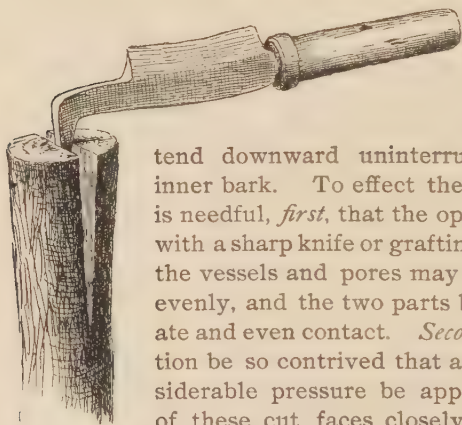


FIG. 28.—Grafting Chisel.

tend downward uninterruptedly through the inner bark. To effect these two requisites, it is needful, *first*, that the operation be performed with a sharp knife or grafting chisel, Fig. 28, that the vessels and pores may be cut smoothly and evenly, and the two parts brought into immediate and even contact. *Secondly*, that the operation be so contrived that a permanent and considerable pressure be applied to keep all parts of these cut faces closely together. *Thirdly*, that the line of division between the inner bark and the wood coincide or exactly correspond in each; for if the inner bark of the one sets wholly

on the wood of the other, the upward current through the wood and back through the bark is broken, and the graft cannot flourish or grow. And, *fourthly*, that the wounded parts made by the operation be effectually excluded from the external air, chiefly to retain a due quantity of moisture in the parts, but also to exclude the wet, until, by the growth of the graft, the union is effected.

1. The first requisite is best attained by keeping a keen,

flat-bladed knife to cut the faces, and another knife for other purposes. Fig. 29.

2. The second requires that the jaws of the stock, in cleft-grafting, press with some force, but not too much, against the wedge-shaped sides of the graft. A stock one-third of an inch in diameter will sometimes do this sufficiently; but three quarters of an inch is a more convenient size. In whip-grafting, the tongue and slit should be firmly crowded or bound together.

3. The third requisite is attained by close examination with the eye.

4. The fourth is accomplished by plasters of grafting-wax, or by the application of grafting-clay. Grafting-wax may be purchased of any seedsman, or if preferred for any reason it may be made by melting together rosin, tallow, and beeswax. An excellent grafting-wax is made of three parts of rosin, three of beeswax, and two of tallow. A cheaper com-



FIG. 29. — Grafting, Budding and Pruning Knives.

position, but more liable to adhere to the hands, is made of four parts of rosin, two of tallow, and one of beeswax. These ingredients, after being melted and mixed together, may be applied in different ways. The wax may be directly applied when just warm enough to run, by means of a brush; or it may be spread thickly with a brush over sheets of muslin, which are afterward, during a cold day, cut up into plasters of convenient size for applying; or, the wax, after becoming cold, may be worked up with wet or oiled hands, drawn into thin strips or ribbons, and wrapped closely around the inserted graft. In all cases success is more certain, when the wax is pressed so as to fit to every part, and leave no interstices; and it is indispensable that every portion of the wound on the stock and graft be totally excluded from the external air. In cool weather, a lantern, or hot brick, or some other method of obtaining heat will be found necessary to soften the plasters before applying them.

CUTTING GRAFTS.—Cut these in autumn if you have a good place to pack them, but if well kept they may be taken at any time between the cessation of growth in late summer or au-

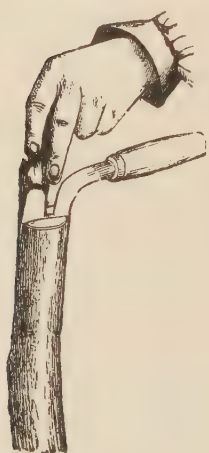


FIG. 35.—Cleft-grafting.



FIG. 34.—Opening the Cleft.



FIG. 31.



FIG. 33.

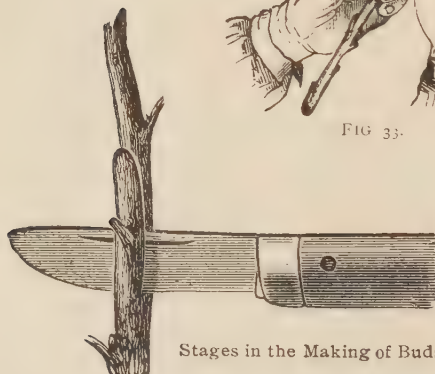


FIG. 32.



FIG. 30.

tumn, and the commencement of vegetation in spring. Those cut in autumn, however, will have more vigor in spring than if exposed to the cold of any severe winter—this is especially the case with plums, pears, and cherries. Pack them in boxes

of damp (not wet) moss, or in small boxes of damp (not wet) sawdust—large boxes of sawdust will heat. Mark every sort carefully and plainly. Another good way to keep scions through winter is to place them snugly in a box till it is more than half full; next nail in two or three cross-pieces to hold them, and then bury the box inverted with several inches of earth over it, on a dry spot or knoll. They will thus be kept from contact with the wet earth, and will receive enough moisture from below to keep them fresh and plump. Cuttings of currants, grapes, quinces, gooseberries, etc., are to be taken off in autumn, and they may be kept till early spring in the same way as grafts, or they may be set out at once, pressing the earth compactly against them and covering well till spring with manure, litter, leaves, or evergreen boughs.

The accompanying engravings (Figs. 30 to 36), serve to show more distinctly than the directions given in the preceding part of this chapter, the details of the operations of budding and grafting. Fig. 30 represents the appearance of a shoot of the pear, of one summer's growth, at the time it is cut

FIG. 36.

from the parent tree to furnish the buds, and will answer as an illustration for the apple, cherry, or other fruit. The portion between the cross-lines furnishes the best developed and



FIG. 45.—Grafts Packed for Sending by Mail.

FIG. 37. FIG. 38. FIG. 39.
Making and Packing Grafts.

ripened buds. Fig. 31 is the appearance of the shoot after the leaves are cut off. Fig. 32 shows the manner in which the budding-knife is inserted

under the bud for its removal; and Fig. 33 the position in which the shoot is held during the operation. Fig. 36 shows a common method of making the buds by cutting upwards.

CARE OF GRAFTS.—In cutting, the name may be kept temporarily by writing with a common lead-pencil on a shaved portion of the shoot (Fig. 37); but for packing away permanently, write the name on both sides of a strip of shingle, say a foot long and half an inch wide (Fig. 38), and tie this up with the scions, the outside writing readily showing the name, the inner to refer to in case the outside is erased (Fig. 39). Scions not fully hardy, as of most sorts of plums, should be



FIG. 41.



FIG. 42.



FIG. 43.



FIG. 44.

cut early in winter, or before they have been exposed and injured by severe cold.

In order to send scions by mail, they are best put up by enclosing them in cases of oil-silk (such as is used for hat-lining), by wrapping the oil-silk about the scions and over the ends, and then passing a fine thread repeatedly round from end to end, making the whole air-tight (Fig. 40). The natural moisture is thus preserved, and they cannot shrivel. The names should be written with pencil on the ends, and no paper for this purpose wrapped around them, as it absorbs the moisture

Grafts have been shrivelled and spoiled by mistakenly placing dry cotton batting among them before thus encased. To send grafts in larger quantities, or by "express," pack them in alternating layers of fine, slightly damp moss. It is always important, whether packing grafts for keeping or for distant conveyance, to preserve the natural moisture precisely, and no more. If the packing is too wet, they will become water-soaked and rot.

Grafts which have become dry may be restored if the moisture is applied so gradually that its absorption may require several weeks, by burying them as above stated.

The following figures represent the two most common modes of grafting fruit-trees: Figs. 41 to 44 representing successive stages of *whip or tongue grafting*, from the sloping cut of the scion and stock, to the completion of the operation by the covering with the wax plaster.

Whip-grafting may be employed for large as well as small stocks. In order that the line of separation between the bark and wood may coincide in both, unless the graft be as large as the stock it must be placed at one side (Fig. 45), *a*, sloped and tongued for the reception of the graft, *b*, their union being represented by Fig. 46. To facilitate the wrapping of the wax plasters, one side and the upper point of the stock are pared off with a knife, before the two are joined, as shown by the dotted line. This is a good mode of grafting any stocks not over three-fourths of an inch in diameter, in the nursery row.

Fig. 47 shows a stock cut off for cleft-grafting, with the upright cleft separated by the grafting-chisel ready for the graft; Fig. 48, the graft cut wedge-form to fit it; Fig. 49, the graft in its place, and Fig. 50 shows a cross-section illus-



FIG. 45. FIG. 46.
Whip-grafting Large Stocks.

trating the fitting of the parts. The exposed parts are then thoroughly waxed.

Whip-grafting is particularly applicable to small stocks, or where the graft and stock are nearly of equal size; and cleft-grafting to stocks considerably larger than the graft. In all cases, where the stock is any degree larger, the graft must be placed toward one side, so that the line between the bark

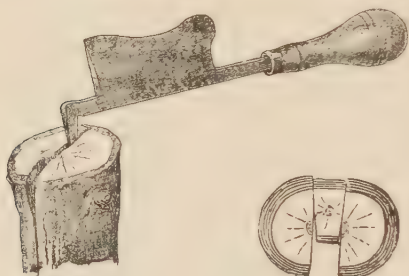


FIG. 47.

FIG. 50.
Cleft-grafting.

FIG. 48.



FIG. 49.

and wood may exactly coincide at one point at least in both, as in the cross-section of cleft-grafting, Fig. 50. A useful implement for the rapid and perfect performance of cleft-grafting is the grafting chisel, here shown.

In SADDLE-GRAFTING, the stock is sloped off on each side, giving it the form of a wedge, Fig. 51, *a*; the graft is split in the middle, and each side thinned away with the knife, as in Fig. 51, *b*, until it will closely fit when placed like a saddle upon it. The most perfect way to fit the graft is to make a long sloping cut from the outer edge or bark, by drawing the blade from heel to point, till it reaches the centre of the graft, and then another similar cut completes the acute cavity for fitting the wedge of the stock. A sharp, broad, and



FIG. 51.

FIG. 52.
Saddle-grafting.

FIG. 53.

thin blade is needed for this operation. A wax plaster, drawn closely round the place of union, completes the work. When the stock and graft are very nearly of equal size, this is a very perfect mode of grafting, as large corresponding surfaces are made to fit, and the graft receives freely the ascending sap.

In all these modes of grafting, whenever a wedge is made to enter a cleft, it should be thickest on the side where the fit is made between the two parts, so as to receive the full pressure of the cut faces at that side, as shown in Fig. 50.

A modification of saddle-grafting, very successful in its results, is thus performed: Late in spring, after growth has commenced, the scion, which is much smaller than the stock, is split up, nearer to one side, more than half its length (Fig. 53). The stronger side is then sharpened into a wedge at its point, and introduced between the bark and the wood, a slight longitudinal slit being made through the bark of the stock, that it may open slightly and admit the graft. The thinner division of the graft is fitted to the opposite sloping side of the stock. The whole is then covered with wax. The great length of that portion of the graft in contact with the bark and fresh wood greatly facilitates their union; while the cut face of the stock is speedily covered with a new growth by that part of the graft which rests upon it.

Veneer-grafting is still another method, strongly advocated by some. Mr. E. S. Crandall of Michigan thus describes the process. Fig. 54 will explain the veneer-graft: A shows the cuts upon stock and scion; these cuts are not to extend into the wood, but simply through the bark, so that when placed in position the exposed broad surfaces of cambium come together; B shows stock and scion in contact, and bound with raffia or other material; C shows a veneer-grafted apple-tree after one season's growth.



FIG. 54.—Veneer-grafting.

While the cuts are easier to make than those of the whip-graft there is this disadvantage, which to men who graft in quantity is an important consideration—that it requires more care in the tying. The band must be strong and should be firmly adjusted, to insure keeping the scion in place until union is effected.

It seems almost unnecessary to remark that in grafting, when cut surfaces of hard wood are placed together, no union takes place between them, and yet I have not unfrequently met practical men, who could graft well, who were not clear on this point, but supposed that union took place over the whole cut surface. It is in the cambium and young sap-wood, and there only, that the power of union and growth lies.

Now, in the veneer-graft, the only cut surfaces of wood are the oblique end-cuts, and as stock and scion are placed together, the oblique cut on the scion is covered by the tongue of bark on the stock, so that if the work is well done union takes place all around the cut wood, and it is securely protected from outside influence. The oblique end-cut on the stock being surrounded by growing tissue is usually imbedded in new growth the first season. The union between the side-cuts, which should be of the same width, and from an inch to an inch and a half in length, is complete throughout. This I have proved by making transverse and longitudinal sections of a large number of grafts.

In grafting the peach, which, from its large pith and spongy wood, scarcely ever succeeds as commonly performed, it is found advantageous, in selecting the grafts, to leave a part of the wedge portion of the more compact two-years' wood at the lower extremity.

In grafting the plum and cherry, success is found to be much more certain when the work is performed very early in spring, before the buds commence swelling, or even before the snow has disappeared from the ground. Apples and pears may be grafted later, and if the scions have been kept in good condition in a dormant state, they will mostly grow if inserted even after the trees are in leaf.

After a graft is inserted, and as soon as the tree commences growth, the buds on the stock must be rubbed off, in order to throw the rising sap into the scion. If large trees are grafted, the buds need only rubbing off the branch which holds it.

Where it becomes desirable to preserve rare sorts, which

have been grafted late in spring, a loose wrapper of white paper round the graft will protect it from the drying and scorching rays of the sun; or shrivelling and failure will often be prevented by covering the whole graft with a wax plaster; or by encasing it in moss kept damp by occasional applications of water.

ROOT-GRAFTING. This is done by whip or tongue grafting, already described on a previous page. It is wholly performed



FIG. 55.

within doors, and consequently the seedlings must be taken up the preceding autumn.

Root-grafting is well understood by nurserymen; but there are many who desire information on the subject, and especially on the expeditious performance of this operation. A grafter may work hard a whole day, and by an inconvenient



FIG. 56.—Showing a Cut from Shoot, Natural Size.

arrangement of tools and materials, insert not a third as many as another, who gives careful attention to all these particulars. The following method is the result of long practice, and by it we have known a skilful workman to insert three thousand grafts, with an assistant to apply the wax plasters, during ten hours in a single day, in the best manner, and three thousand five hundred on another occasion, in eleven hours.



FIG. 57.

The tools consist, first, of a sharp, thin-bladed knife, of which the best is made from the blade of an old scythe, ground to its proper form on a grindstone; second, a bench or table placed in front of a light window, and on which the work is done; third, an apron, worn by the grafter, the two

lower corners being hooked fast to two sharp nails on the near edge of the table, for holding the scions while cutting them; fourth, strips of waxed paper, about an inch wide, made by brushing over sheets of thin, tough paper a melted



FIG. 58.

well-stirred mixture of four parts of rosin, two of tallow, and one of beeswax, and then cut into strips when precisely at a proper degree of coldness to separate well by means of a knife cutting upon a smooth board. A sufficient number of

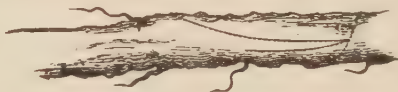


FIG. 59.

these for immediate use should be hung near enough to the stove which heats the room, to keep the wax upon them about the consistence of butter on a summer day, so as to fit and adhere to the grafted root, without melting and running.



FIG. 60.

The first operation is to cut up the grafts from the shoots or scions. It is performed by holding the scion in the left hand, the thicker end pointing toward the right hand, which holds the knife. Such a shoot is represented of diminished size by



FIG. 61.

Fig. 55, the points, *a, a, a*, the places where it is cut into grafts, and the dotted lines show how the cuts are made. Fig. 56 shows a portion of the shoot the natural size; 1, the first cut nearly directly across; 2, the second or sloping

cut, and 3, the slit for the tongue; and the whole finished and separate in Fig. 57. Three strokes of the knife are thus required to cut and prepare each graft, and a rapid and skilful operator has done one hundred and twelve in the manner described, in five minutes. Each shoot is thus cut up while yet held in the left hand, and the grafts, as fast as they are severed, drop into the cavity of the apron already described. The counting is done during the process of cutting, and at no other time.

The second operation is setting these grafts into the roots. Each root is held in the left hand precisely as the scion has been (Fig. 58); the three cuts are given it (shown by the



FIG. 62.—Piece Roots.

dotted lines in Fig. 59), to prepare it for the graft (as represented in Fig. 60). The grafts having been placed directly under the operator's fingers, and in the right position, each one is successively taken and firmly fitted to the prepared root, as shown in Fig. 61, and as soon as this is done, another cut of the knife, three inches lower down the root, severs it, and the root-graft is finished, and drops off obliquely on the table. Another sloping cut on the same root, and a slit for the tongue, are quickly made, and another graft picked up and inserted, the root being held all the while in the left hand, until worked up. The great point is to perform much with little handling. A single root will sometimes make but one graft, which is then called whole-root graft; but more

commonly two or three, and sometimes more, which are called piece-root grafts. Each portion of root should be about three inches long, and the graft about five inches.

The comparative advantages and disadvantages of whole-root and piece-root grafting have been subject for controversy ever since Thomas A. Knight introduced the latter in 1811. It is apparent that the economy of piece root-grafting, in that one root is made to serve as the foundation for several trees, must commend it upon commercial grounds—but it has advocates who also strictly maintain that it produces as many and as good roots as the whole-root process. The weight of evidence, however, appears against it—and there are few, prob-

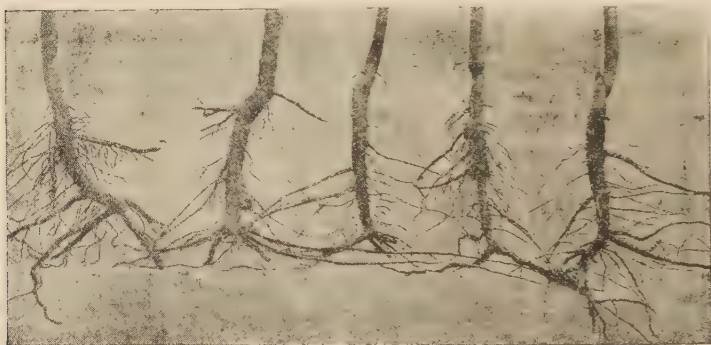


FIG. 63.—Whole Roots (Budded).

ably, who at the same price would not prefer to try stock which had been grafted or budded upon whole roots.

Figs. 62 and 63 by Mr. L. H. Bailey show the characteristic appearance of both processes.

Root-grafting may be performed at any time during winter, and those who have much of it to do often continue the process the winter through. The roots when taken up in autumn should be well washed, the tops cut off, and the roots packed in boxes with alternate layers of damp moss. Thrifty one-year roots are better and more easily worked than two-year roots. Side roots, or branches, should never be used. The scions may be kept in the same way. This is better than packing them in sand, which imparts a grit to them and dulls

the knife. Different modes are adopted for packing away the grafts. The best is to place them flat in boxes, in alternate layers with sand, like miniature cord-wood, keeping the outer or graft-ends very even, and carrying up each layer separately and one at a time, so that one may be taken up for setting out, without interfering with the next succeeding pile. The sand should be slightly moist but not wet. The varieties should be distinctly marked on strips of board separating each kind, where there is more than one in a box; and in addition to this, a card should be nailed on the outside, naming the kinds, at the point of separation between them. A record should also be made as they are deposited, of the sorts, their order, and the number of each. Boxes two feet long, a foot wide, and six inches deep, are a convenient size, and will hold from one to two thousand each. If furnished with bow handles, they are easily carried at once to the field for setting out. Boxes holding twenty thousand or more keep the grafts equally well, but require additional labor in unpacking when set.

They should be set out in spring as soon as the soil is sufficiently dry, and there is no further danger of its freezing severely. Special pains should be taken to pack the earth well about them, as they are dibbled in. The tips of the grafts should project about half an inch above the surface. The proper depth of setting is controlled somewhat by circumstances; if deep, the soil may be too cold to start them well; if not deep enough, the drought of summer may destroy them. An active hand will set two or three thousand in a day, and in rare instances five thousand.

IV. BUDDING.

Budding consists in introducing the bud of one tree, with a portion of bark and a little adhering wood, beneath the bark of another, and upon the face of the newly forming wood. It must be performed while the stock is in a state of vigorous growth. An incision is made lengthwise through the bark of the stock, and a small cut at right angles at the top, the whole somewhat resembling the letter T, Fig. 64. A bud is then taken from a shoot of the present year's growth, by shaving off the bark an inch or an inch and a half in length, with a

small part of the wood directly beneath the bud, Fig. 65. It is not a common practice in this country to take the thin shield of wood out of the butt, but it is sometimes done ad



FIG. 64. FIG. 65. FIG. 66. FIG. 68. FIG. 69.
Successive Stages of Budding.

vantageously when this portion of wood is too old or hard to fix the stock readily. The edges of the bark, at the incision in the stock, are then raised a little, Fig. 66, and the bud held as shown in Fig. 67, pushed downward under the bark, Fig. 68 and Fig. 70. A bandage of raffia bass, or other substance, is wrapped round, covering all parts but the bud. The pressure should be just sufficient to keep the inserted portion closely to the stock, but not such as to bruise or crush the bark, Fig. 69 and Fig. 71.



FIG. 67.—One Manner of Holding Bud.

The shoots containing the buds should be cut when so mature as to be rather firm and hard in texture; they are usually in the best condition after the terminal bud has formed. To prevent withering, the leaves must be immediately cut off, as they withdraw and exhale rapidly the moisture from the shoot; about one-quarter of an inch of the footstalks of the leaves should remain, to serve as handles

to the buds while inserting them, Fig. 72. After being thus divested of leaves, they may be safely kept a week in a cool, damp place, or sent hundreds of miles in damp moss, or en-



FIG. 70.—Bud being Inserted.

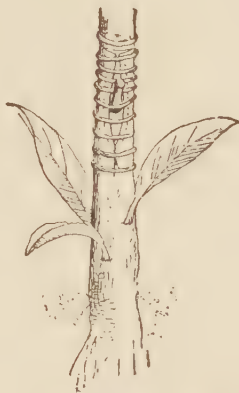


FIG. 71.—Bud Tied.

cased separately in thin oil-cloth.

When, by growth of the stock, the bandage cuts into it, usually in ten days or more, it must be removed. The bud remains dormant till the following spring, when the stock is cut off two inches or more above it, before the swelling of the bud. If cut closer, the end of the stock becomes too dry, and the bud often perishes. All other buds must be then removed, and all the vigor of the stock or branch thrown into the remaining bud, which immediately commences a rapid growth.

To secure a straight and erect



FIG. 72.—Stick with Buds.



FIG. 73.—Tying the Young Shoot
See Fig. 134.

tree, the new shoot, when a few inches long, is sometimes tied to the remaining stump of the stock, Fig. 73. By another month, no further support will be needed, and the stump may be wholly cut away, and the wound allowed to heal by the rapid formation of new wood.

Buds inserted by midsummer may be made to grow the same season by heading down the stock when adhesion has taken place; but although often attempted, no advantage has resulted from this practice, as the growth is comparatively feeble, and in consequence of its badly matured wood often perishes the following winter. Even where it escapes it does not exceed in size at the close of the second season the straight and vigorous shoots of the spring.

TERMINAL BUDDING.—It sometimes happens, where buds are scarce, that the terminal bud on the shoot may be used to advantage. In this case, the wood is cut sloping downward, and the insertion is made as usual, Fig. 74, except that it becomes necessary to apply the whole of the ligature below the bud. The buds on small side-shoots which are not more than an inch or two long, may be successfully used in this way, as the terminal eyes are stronger than any of the others. This practice may sometimes be adopted with advantage with the peach, where scions of feeble growth only can be obtained, as terminal buds usually escape the severity of winter when most of the others are destroyed.



FIG. 74—Terminal Budding.

SPRING BUDDING is successfully practised as soon as trees are in leaf, the buds having been kept dormant in an ice-house or cool cellar. As soon as they have adhered, the stock is headed down, and a good growth is made the same season. The peach, the nectarine, the apricot, and the mulberry, all difficult to propagate by grafting, may in this way be easily increased by budding. For a description what is called "*June budding*" see chapter xxviii. on the peach. If the buds are kept in a cellar, it will be found important to preserve with them as uniform a degree of moisture as possible, and in as small a degree as will keep them from wilting.

ANNULAR BUDDING is applicable to trees of hard wood, or thick or rigid bark, as the walnut and magnolia. A ring of bark is removed from the stock; and another corresponding ring, containing the bud, slit open on one side, is made to fit the denuded space (Fig. 75).

The essential requisites for success in budding are, *first*, a thrifty, rapidly growing stock, so that the bark will peel very freely. *Secondly*, a proper time; not so early that there will be too little cambium or mucilaginous cement between the bark and the wood, for the adhesion of the bud; nor so late that the bark will not peel, nor the subsequent growth sufficiently cement the bud to the stock. *Thirdly*, buds sufficiently mature. *Fourthly*, a keen, flat knife, for shaving off the bud, that it may lie close in contact upon the wood of the stock. *Fifthly*, the application of a ligature with moderate pressure, causing the bud to fit the stock closely.



FIG. 75.—Annular Budding.

When stocks are in the best condition, it is unnecessary to raise the bark any further than to admit the lower point of the bud, which as it is pushed downward, performs this operation in the most perfect manner. When the bark does not peel freely enough for this purpose, success becomes uncertain.

Budding is performed in summer, grafting in spring, and both have their advantages. Budding is a simpler operation, and more successfully performed by a novice. It is the best means to multiply the peach and nectarine, grafting rarely proving successful at the North. It is more rapidly performed, and at a season not crowded with the labors of transplanting. It admits a repetition the same summer, in cases of failure, the stocks remaining uninjured. But in all cases thrifty stocks are needed, while grafting will succeed on those older and less vigorous. Grafting requires less care subsequently, as no ligatures need removing, nor stocks heading down, and may be conveniently employed as a remedy for failures in the previous summer's budding.

LIMITS OF BUDDING AND GRAFTING.

In former ages of the world, it was erroneously supposed that grafting could be performed between every species of

tree and shrub. "Some apples," says Pliny, "are so red that they resemble blood, which is caused by their being at first grafted upon a mulberry stock." Roses, it was said, became black when grafted on black currants, and oranges crimson if worked on the pomegranate. But the operation is never successful unless the graft and stock are nearly allied, and the greater the affinity the more certain the success. "Varieties of the same species unite most freely, then species of the same genus, then genera of the same natural order; beyond which the power does not extend. For instance, pears work freely upon pears, very well on quinces, less successfully on apples or thorns, and not at all upon plums or cherries; while the lilac will take on the ash, and the olive on the Phillyrea, because they are plants of the same natural order."

There are, however, some exceptions to this rule. Thus, the cultivated cherry, and most species of wild cherry, though of the same genus, will not agree. The pear succeeds better on the quince than on the apple, although the apple and pear are within the same genus, and the pear and quince are by most regarded as of distinct genera; the superior firmness of the wood of the quince, a quality so important to successful grafting, more than compensates the difference in affinity.

Lindley mentions also some exceptions which are apparent only. In one case, the fig was supposed to grow on the olive. But the graft, being below the surface of the soil, rooted independently of the fig-stock. "I have seen," says Pliny, "near Thulia, in the country of the Tiburtines, a tree grafted and laden with all manner of fruits, one bough bearing nuts, another berries; here hung grapes, there figs; in one part you might see pears, in another pomegranates; and to conclude, there is no kind of apple or other fruit but there was to be found; but this tree did not live long." This is explained by the process now sometimes performed in Italy, for growing jasmines and other flexible plants on an orange-stock, by the ingenious trick of boring out the orange stem, through which the stems of the other plants are made to pass, and which soon grows so as to fill it closely, and to appear as if growing together. Such a crowded mass of stems must, of course, soon perish.

SAVING MICE-GNAWED TREES.—A MODIFICATION OF GRAFTING.

Young orchards which are kept perfectly clean by cultivation, are seldom injured by mice under snow. There are some instances, however, where mice will attack those which stand near the boundary fences or in proximity to grass; and sometimes a hard crust of ice or snow may be formed on the surface, over which mice will travel beneath a second fall of snow, in committing their depredations. Many young orchards are more or less encumbered with grass and weeds, and the trees are often found girdled in spring. A preventive that rarely fails, that of embanking small mounds of smooth earth



FIG. 76.



FIG. 77.



FIG. 78.

Bridge-grafting over a Wound.

round the trees in autumn, is not often adopted, and hence we have frequent inquiries, "What shall we do to save our mice-gnawed trees?"

Fig. 76 represents the stem of a young tree entirely girdled near the surface of the ground. The tree will, of course, perish unless a connection is made between the two portions of bark.

An easy way to repair this damage is represented in Fig. 77. It consists merely in fitting into openings, made with a half-inch chisel, short pieces of round wood sharpened at both ends to fit the chisel-cuts. These cuts are made by placing the chisel, when making the lower cuts, nearly upright or slightly inclining outward from the tree, and then placing the point upward in a corresponding direction when making

the upper cuts. The sharpened pieces or shoots are then bent outward in the middle until the points will enter the openings, when they are firmly crowded in with the hand until brought nearly straight, as shown in the figure. Fig. 78 exhibits a section of the tree and the exact position of these pieces when inserted. Where a large number of trees are injured, four or five pieces to each tree are enough. They will rapidly enlarge as the tree grows, and in a few years become confluent. If a few choice trees have been girdled, a larger number may be inserted, so that they may be nearly in contact—thus securing a complete cure in a year or two. The work may be covered with grafting wax or with a small mound of earth—perhaps the operation would be successful without any covering. It is not necessary that it be performed very early in spring—it will even answer after the buds have begun to swell.

CHAPTER IV.

SOIL, MANURES, SITUATION, AND ENCLOSURES.

THE soil for fruit-trees, as well as for farm crops, should be of good quality. Whatever will produce a vigorous growth of corn and potatoes will in general be the best for fruit-trees. Sterile soil is unfavorable for both; but doubly so for the latter; for while it only lessens in *quantity* the growth of farm crops, it lessens the quantity and greatly injures the *quality of fruit*.

Good soils vary in many particulars; but as a general rule, one which is dry, firm, mellow, and fertile, is well suited to this purpose. It should be deep, to allow the extension of the roots; dry, or else well drained, to prevent injury from stagnant water below the surface; firm, and not peaty or spongy, to preclude injury or destruction from frost.

Few soils exist in this country which would not be much benefited, for all decidedly hardy fruits, as the apple and pear, by enriching. Shallow soils should be loosened deeply by heavy furrows; or if the whole surface cannot be thus treated, a strip of ground eight feet wide, where the row of trees is to stand, should be rendered in this way deep and fertile for their growth. Manure, if applied, should be thoroughly intermixed with the soil by repeated harrowings. An admirable method of deepening soils for the free admission of the fine fibrous roots is, first, to loosen it as deeply as practicable with the subsoil-plough; and then to trench-plough this deeply loosened bed for the intermixture of manure. The previous subsoiling admits the trench-plough to a greater depth than could be attained without its aid. The only trees which will not bear high fertility are those brought originally from warmer countries, and liable to suffer from the frost of winter, as the peach, nectarine, and apricot; for they are

stimulated to grow too late in the season, and frost strikes them when the wood is immature. It however happens, in the ordinary practice of the country, that where one peach or apricot tree is injured by too rich a cultivation, more than a hundred suffer by diminished growth from neglect.

Clayey and light soils in some cases require opposite management. The former, for instance, is much benefited by the admixture of chip-dirt, which renders it looser, lighter, and more retentive of moisture. But on light soils the effect is not so beneficial, and is sometimes positively injurious.

Peaty and spongy soils are particularly unfitted for tender fruits. They are very likely to suffer from summer droughts. If the season is propitious, the plants are likely to make a long, soft growth and to be injured by the succeeding winter. It is a cardinal principle that all tender fruits should go into the winter with well-hardened wood.

MANURES.

Nothing for general use is equal to stable manure, and in ordinary cases it will be found to give the most uniform and satisfactory results—more especially if it is made the basis of



FIG. 79.—Draining Orchards.

a compost with peat, muck, or turf from old pastures, with a tenth or a fifteenth of leached ashes, and half that of bone-dust. If these are thoroughly mixed with the soil down to a depth of a foot or more, by subsoiling, trench-ploughing, and cross-ploughing, in connection with repeated harrowings, fine trees and excellent fruit may be confidently expected even on

soils of naturally moderate fertility. Many parts of the Western States possess a soil quite rich enough, provided good cultivation is given. A *well-drained* subsoil is of course all-important, for all manure is nearly lost on land kept soaked with water. Even old bearing trees have been much improved by laying tile two and a half or three feet below the surface, midway between the rows (Fig. 79). The young forming-roots, being the most remote from the tree, receive the greatest benefit from drains thus placed, and the tile is less liable to be thrown out of position by large roots or filled by smaller ones.

SITUATION.

After a suitable soil is obtained, hardy trees, such as the apple, will usually succeed in almost any situation. But with tender fruits, as the peach and apricot, the case is very different. In many localities in the Northern States, they are soon destroyed by the severity of winters, and their cultivation is accordingly not attempted. In others, crops are not yielded oftener than once in two years. But some situations are so favorable, that a failure scarcely ever occurs. In planting out tender fruits, it is consequently desirable to know what places will prove the best. Even the apple, in regions where the winters are rigorous, is sometimes destroyed by frost, and in very unfavorable places rarely escapes.

It is familiar to many cultivators, that warm, low valleys are more subject to night-frosts than more elevated localities. Objects at the surface of the earth are chilled by the radiation of heat to the cold and clear sky above, and they cool by contact the surrounding air, which thus, becoming heavier, rolls down the sides of declivities and settles like the waters of a lake, in the lowest troughs. This coldness is further increased by the stillness of those sheltered places favoring the more rapid cooling, by radiation of the exposed surfaces; while on hills the equilibrium is partially restored by currents of wind. Superadded to these causes, vegetation in low, rich, and sheltered places is more luxuriant, and wood less ripened, and hence particularly liable to injury from frost. The mucky soil of valleys radiates heat rapidly from its surface. The

warmth of low places, during the mild weather, occurring in winter, often swells fruit-buds, and succeeding cold destroys them. On more elevated lands, vegetation escapes all these disastrous influences.

The existence of colder air in valleys, on still, clear nights, is often plainly observed in riding over a rolling or broken face of country. The thermometer has shown a difference of several degrees between a creek bottom and a neighboring hill not fifty feet high. A striking proof was exhibited a few years since after a severe night-frost early in summer. The young and succulent leaves of the hickory were but partially expanded; and where the trees stood in a valley, twenty feet deep, all the leaves had been frosted, and were black and dead, up to the level of the banks on each side, while all above the surface of this lake of cold air were fresh and green.

During the cold of a clear winter night some years ago, which sank the thermometer several degrees below zero, after the peach buds had been swollen by a few warm days, trees which stood on a hill thirty feet higher than the neighboring creek valley lost nine-tenths of their blossoms; while on another hill sixty feet high, nine-tenths escaped. The lake of cold air which covered the top of the smaller hill did not reach the summit of the larger.

The cultivation of the peach is rarely attempted in the southern tier of counties in the State of New York. Proofs are not wanting, however, that it might be entirely successful on selected ground. A number of instances have been observed where peach orchards, planted on the dry lands of the hills in different parts of this region, have flourished and bore regularly; at the same time that orchards in the warm valleys below rarely yielded crops, and the trees themselves were sometimes destroyed.

These cases show the importance of elevated sites. A dry, firm soil is, however, of great consequence. The influence of a compact knoll, rising but slightly above the rest of the field, has been observed to save from frost the corn which grew upon it; while on the more mucky or spongy portions of the rest of the field, radiating heat more freely, the crop has been destroyed. Cultivators of drained swamps have found it nec-

essary to plant such lands with tender crops two or three weeks later in spring than the usual period on upland. The successful cultivation of the peach and the grape, on the gentle swelling hills called *mounds*, in the Western prairies, while the crops are destroyed on the adjacent dark and porous soils of the plains, affords another example. Sometimes the effect of unfavorable soil more than overbalances that of situation. In some of the hilly parts of western New York, where the highest land is peaty, spongy, or springy, and the valleys dry and firm, the latter are found best for the peach.

The preceding facts furnish strong reasons for believing that, in large portions of the Northern States, where the cultivation of the peach has been entirely relinquished in consequence of the only attempts having been made in the warm valley, abundant crops might be regularly obtained by a proper selection of soil and locality. Even much farther south, the occasional destruction of tender fruits points out the great importance of careful attention to situation.

Large bodies of unfreezing water in the bottoms of valleys will reverse some of the preceding rules, and the banks of such waters are peculiarly adapted to the cultivation of tender fruits. Note how grape culture follows such locations. They soften the severity of the cold, by the large and warm surface constantly presented; on the other hand, they chill the dangerous warm air which starts the buds in winter, and they afford great protection by the screen of fog which they spread before the morning sun. Along the borders of the lower parts of the Hudson, and on the banks of the Cayuga and Seneca lakes, tender fruit-trees often afford abundant crops, while the same kinds are destroyed only two or three miles distant. Along the southern shore of Lake Ontario, the peach crop scarcely ever fails, and the softening influence of that large body of unfreezing water extends many miles into the interior. The same result is observed in northern Ohio, bordering on Lake Erie; and in western Michigan, adjoining the great lake of that name.

Fruit-buds, as well as tender trees, are occasionally destroyed by thawing by the morning rays, after a cold night. The protection from these rays afforded by an eastern hill, buildings, or other screen, has led to the erroneous conclu-

sion that the destruction alluded to was caused by the *east wind*.

It has frequently been observed that when the lower branches of a peach-tree have been buried in a snow-drift, the crop thus covered was saved. This has suggested the successful practice of training peach-trees low, and covering the branches in winter with masses of evergreen boughs. The rigidity of the stems prevents their bending down; but as the roots are more flexible, laying down has succeeded by digging under on one side, the trees having been previously trained flat for this purpose.

In localities exposed to the sweep of winter winds, belts of evergreen or deciduous trees will be found of great service. In all instances where the side of an orchard, exposed to prevailing winds, is less successful and productive than the opposite side, proof is afforded that shelter would be beneficial; belts, especially if of deciduous trees, standing too near fruit-trees have, however, rather injured than benefited them. The orchards should be beyond the reach of their shade and roots, and be well exposed to sun and air.

ENCLOSURES.

The skilful cultivator, after having prepared his ground, procured the best trees the country affords, carefully transplanted them, and given them watchful and laborious attention for years, feels a very natural desire to partake of their fruits. But this he cannot do, in many places, unless his fruit-garden is protected from rambles of idle boys. It cannot be denied that our country is rather remarkable for its fruit-pilferers. It is feared it will continue to be so, until public opinion shall place the young man who steals a pocket-book, and the depredator of fine fruit, which has cost the owner as much care and labor, and which money cannot replace, on precisely the same level.

This formidable evil has deterred many from planting fruit-gardens. The most quiet and secure protection is afforded by a good barbed wire-fence. The English hawthorn, far to the north, will generally succeed quite well for this purpose. The buckthorn is extremely hardy, has a thick dense growth,

and is easily raised and transplanted; but, except on very rich soils and with good cultivation, it does not form a stout barrier. The Honey Locust is also very hardy, but requires more care in cutting back and thickening; it may, however, be made into an excellent hedge for a fruit-garden if the most thorny plants are selected. The Osage Orange, where the winters are not too severe, is also good. It is so liable to winter-kill, however, that hedges of it are often ragged and unsightly. It is densely armed with sharp thorns and if well kept soon becomes impassable. In New York, it is only hardy on dry ground or near the line of an underdrain.

Two reasons have operated in preventing a more general and successful adoption of hedges. One is the aversion so prevalent to undertake anything which does not produce immediate results, several years being required to make a perfect hedge. The other is the almost universal notion adopted without a moment's thought that everything in the form of a tree must grow and take care of itself. Hence we see for every good well-managed hedge at least one hundred bad and neglected ones. This remark applies with more force to the attempts made with the Osage Orange than with any other plant; for nothing that is ever used for hedges is more sensitive under bad usage or succeeds better if well treated than this. The privet and the buckthorn will usually present something of a hedgy appearance with any kind of management; but the Osage unless well cultivated and properly sheared will not exhibit even the semblance of a hedge. Hence the common notion that it has proved a failure.

The Osage Orange grows rapidly if well cultivated; and in order to insure a perfectly continuous and even hedge, the young plants must be allowed to swell their buds before they are set out, that all dead and feeble plants may be rejected. The first winter a light furrow should be ploughed upon it, to protect and drain it at the same operation. The soil should be kept deep and mellow by cultivation, at least four or five feet on each side, instead of allowing it to grow up with weeds and grass, as is usual; and, if possible, it should be placed nearly over a tile drain, which will contribute greatly to its endurance of winter.

Evergreen hedges are mostly employed as screens from ob-

servation and from winds; but as intruders scarcely ever attempt to pass where they cannot look through, perhaps they may yet be used as efficient barriers. The American Arbor-Vitæ is well adapted for this purpose, but like the buckthorn it will not grow well in the shade; hence when closely sheared



FIG. 80.



FIG. 81.



FIG. 82.

Trimming Hedges.

the interior branches are bare. Instead, therefore, of being sheared in the common way it should be shortened back. The close growth of a smoothly-shorn surface darkens and kills the interior foliage as shown in Fig. 80. Fig. 81 represents the same shortened back, or rather *thinned back*, admitting the light within. Fig. 82 shows how this is done, the cut being made at a fork *b*, or still shorter at *a*.



FIG. 83.—Badly Pruned Hedge.



FIG. 84.—Badly Pruned.



FIG. 85.—Proper Pruning.

The *hemlock*, although hardly stout enough for a hedge until it has grown many years, forms one of the most perfect and beautiful screens in existence, and it would prove a fine shelter for trees against the wind. Its fresh deep-green color is unsurpassed; and its denseness of growth in consequence of its quality of growing in the shade is scarcely equalled. The

Norway spruce will also make a fine hedge-tree. It grows with great vigor and may be freely shortened back.

Probably the very best shrub for making a handsome, quick-growing hedge is the California Privet (*Ligustrum ovalifolium*). It can be purchased from nurserymen eighteen inches to three feet high in lots of one hundred, at moderate prices. Set out from ten to twelve inches apart in good soil, it will, with proper cutting back each spring, form a dense hedge five or six feet high in a very few years. Three lines of barbed wire running through the middle will effectually prevent passing through it, and at the same time be entirely concealed.

The following figures (some of which are produced from those in *Warder on Hedges*) will show how this, and indeed all hedges, should be sheared.



FIG. 86.—Result of Omitting to Prune.



FIG. 87.—First Year, Newly Set Out.



FIG. 88.—Beginning of Second Year.

The neglect of cutting down at the commencement causes the hedge to become thin and narrow, and full of gaps at the bottom where it should be the thickest; and dense and impenetrable only at the top, where this is less essential. In other words, the hedge becomes wrong-side-up, or mounted on stilts (Figs. 83 and 84). The appearance of the young hedge just before cutting down the first time is shown at *a*, Fig. 85, and the cut portion at *b*. It is almost impossible to induce a novice to cut "this fine growth;" he thinks it will "ruin" his young and promising fence. Yet if the work is omitted, it will in a few years appear as in Fig. 86.

The following is the regular order of working each successive year. Fig. 87 represents the plant the first year, or a few weeks after setting out; it has been cut down nearly to the surface of the earth, the tap-root trimmed off, and the

young shoots as starting from it at *a*. It should grow untouched at least one year—some prefer two years, in order that the roots may become thoroughly established. Its appearance the beginning of the second year is shown in Fig. 88, when it is cut down again near the line, *b*, to thicken it at the



FIG. 89.—Beginning of Third Year.

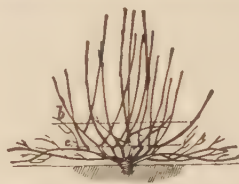


FIG. 90.—Summer of Third Year.

bottom. The result of this cutting down is shown in Fig. 89, which is the same plant after further growth, and which is again to be cut down at the line *c*; this may be done in the spring of the third year, if the hedge has been well managed and kept vigorous. This shearing will not be more than four or five inches high. Nervous people “cannot bear” thus to cut down their beautiful growing hedges—and of course never have a good one. But if the work has been unflinchingly done, the hedge will present by early summer of the third



FIG. 91.—Beginning of Fourth Year.



FIG. 92.—End of Fourth Year or Beginning of Fifth.

year, the fine broad-based, thickened appearance at the bottom, as represented by Fig. 90. The next pruning, to be done at the beginning of the fourth year, is shown in Fig. 91, as indicated by lines meeting at *c*, when the hedge for the first time begins to assume the form of a roof. The previous shearings (or rather mowings) are shown by the dotted lines *c* and *d*. Fig. 92 shows the subsequent cuttings—first by the lines meeting at *h*, and afterward at *o*. The latter may be

straight, as the previous ones, or in the form of a gothic arch, as shown by the figure. This brings the hedge to the close of the fourth year, when it will begin to form an efficient barrier, if it has been well cultivated and pruned. Its breadth at bottom will be nearly double its height. Future years will give it more height; but it must be especially observed to keep it always narrow at top, so that the foliage above shall not shade that below, nor injure the broad thick growth at bottom.

HOOKE TO TRIM HEDGES.—With a common corn knife, like



FIG. 93.—Corn Knife.



FIG. 94.—Hedge Shears.

that shown in Fig. 93, one man has trimmed from half to three-quarters of a mile of four years' hedge on both sides in a day—striking upwards and cutting it to a peak in the middle, like the roof of a house. Hedge shears, Fig. 94, may be had of any dealer in seeds, with which more neat and accurate work can be done.

CHAPTER V.

TRANSPLANTING

ORCHARDS are usually set out, where the soil is good, with no other preparation than good ploughing. But where the soil possesses only moderate fertility, if the best growth and finest fruit is desired, it must receive additional preparation. When marketing and profit is the chief object, this preparation is of great importance, as the finest fruit often brings double the price obtained for that of common quality. The following directions are therefore worthy of attention.

PREPARING THE GROUND AND MANURING.—Ground intended for trees must be secure from danger of being flooded in wet seasons, and from all liability of becoming water-soaked beneath the surface. If not naturally dry enough, it must be thoroughly underdrained.

The next requisite is to deepen and enrich the soil by *trenching*, unless naturally or previously exactly fitted for trees. The same result may be attained by digging very large holes, say eight feet in diameter, and a foot and a half deep, and filling them with rich earth. But a better way is to plough the whole surface to nearly that depth, and to enrich it well by manuring. A common plough will descend six or seven inches; by passing another plough in the furrow—that is, by trench-ploughing—the soil may be loosened to ten inches or a foot. But by means of a good subsoil-plough in the common furrow, a depth of fifteen to eighteen inches may be reached. Now, to work the manure down to that depth, and make the whole one broad deep bed of rich soil, it must be first spread on the surface evenly after the whole has been well subsoiled, then harrow to break it fine, and mix it with the top soil, and then thrown down by a thorough trench-ploughing. For although the trench-ploughing can hardly be

worked a foot in depth of itself, yet after a good loosening with the subsoil-plough, it may be at once extended down a foot and a half. If this is done in the fall, and another good ploughing given in spring, the whole will be in fine condition for the reception of trees. Does this seem like a great deal of cost and labor? It is the very cheapest way of obtaining fine crops of the best fruit; for the strong, long, and healthy shoots which will run up even the first year, and the size, beauty, and richness of the fruit soon afforded from such an orchard, kept well cultivated during its early years, will astonish those who have never seen any but slipshod culture.

In setting out large orchards, if the whole field cannot be deepened, a strip of land ten feet wide extending across the orchard may be treated in the same way, in the centre of which each row is to be set; and the intermediate spaces, constituting two-thirds or more of the whole, may, if necessary, be prepared afterward, by the time the roots have passed the boundaries of the first.

LAYING OUT ORCHARDS.

Every one will admit that an orchard handsomely laid out in perfectly straight rows is in every respect better than where the trees are in crooked lines. An owner can feel no pride in giving proper cultivation to an awkwardly planted orchard; and trees standing out of line will be a constant annoyance to every ploughman who is in the practice of laying perfectly even furrows.

Some planters take great pains in setting their trees, so that one tree at the end of the row will hide all the rest when the eye ranges through the line. But in securing this desirable object, a great deal of labor is often expended in sighting in different directions while setting each successive tree, so that every row may be straight every way. The following mode of laying out and planting will not require one-twentieth of the labor commonly devoted, may be performed under the direction of any common workman, and will give rows that will range perfectly, not only in both directions, but diagonally. The writer has found that two men would thus lay out from thirty to forty acres in a day, with perfect precision for planting.

The first thing to do is to procure as many short pins or stakes, a few inches long, as there are to be trees in the orchard. These may be made by simply splitting short blocks or boards with an axe, say half an inch in diameter; or corn-cobs will answer a good purpose, and may be more easily seen. Then procure a strong cord as long as one side of the orchard, or, if the orchard is very large, as long as each section may be, if necessary to divide it. Then, with a pole or other measure, mark off the distances of the trees on this line, sticking a common brass pin through at each place for a tree, bending

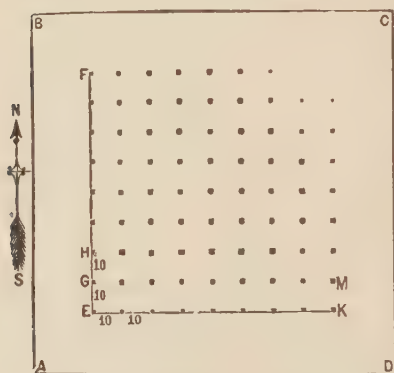


FIG. 95.—Staking out Orchards.

it around the cord so that it will not come out. Red yarn sewed through and tied around the cord would be more visible than pins; but the latter are quickly found if the workman measures the distance by pacing between them as he walks from one to the other. A new cord will stretch a little at first, but will soon cease to do so. The easiest way to mark the

spaces on the cord is to wrap it around the ends of a board cut at the right length, so that every third coil shall be a place for a pin. Thus, if the board is five feet long, by marking every third coil at the end of the board we obtain spaces of thirty feet. The field having been ploughed and fitted for planting, we are now ready for operation. Select a still day, so that the wind will not blow the cord out of place, and then stretch the line along one side of the field, at a suitable distance from the fence where the first row is to be. Make it as straight as possible, by drawing on it forcibly; a stout cord being better than a weak one on this account. If the land be tolerably level, twenty or thirty rods may be measured off at a time. Place flat stones or other heavy weights upon it at intervals, to keep it in position; if there is some wind, care will be necessary in making it perfectly

straight before thus fixing it. Next, drive in one of the short pegs or sticks at each point marked by the pin already described. When this is done, one row will be marked. Then remove the line, and mark each end of the field at right angles to this in the same way. Lastly, mark the remaining side. Before marking both ends, it is safest to stretch the line on the fourth side, that all may be accurately spaced. Next, to fill up this hollow square with the proper marks, stretch the line successively between corresponding sticks on the opposite sides, and mark as before till the whole is completed. If the work has been carefully done, every stake will be found to range perfectly. Every cord will stretch more or less, but if stretched so that the ends will come out even each time, which is attended with no difficulty, the rows will be perfect, as shown in Fig. 95.

Next take a strip of board, say about eight feet' long and six inches wide, as shown in Fig. 97, and cut a notch in one



FIG. 96.

Tree Markers.



FIG. 97.

side at the middle, just large enough to let in the stem of a tree. Bore a hole through each end, exactly at equal distances from this notch. Then, whenever a tree is to be planted, place the middle notch around the peg, and thrust other pegs through the holes at the ends. Then take up the board, leaving these two pegs, dig the hole, replace the board, and set the tree in the notch. Proceed in this way till the whole orchard is planted. It is obvious that the trees will stand precisely where the first pegs were placed, and will range in perfect rows. A large number or series of the two pins may be set successively by the board, so that a number of workmen may be digging and planting at the same time.

TRANSPLANTING.

Very few of our common fruit or ornamental trees ever remain where they first came up from seed, but nearly all are

removed one or more times, to the spot where they are finally to remain. For this reason, transplanting becomes a most important operation. If a tree could be removed with all its roots, including the numerous threadlike radicles, and all the spongelets, and placed compactly in the soil, precisely as it stood before, it would suffer no check in growth. The nearer we can approach this condition, therefore, the greater will be our success.

As a general rule, roots extend as far on each side of the



FIG. 98.

FIG. 99.

FIG. 100.

FIG. 101.

Modes of Digging Nursery Trees.

tree as the height of the tree itself. If, for instance a tree be five feet high, the roots will be found to extend five feet on each side, or to form a circle ten feet in diameter. This rule will not apply to slender trees, which have become tall by close planting, but to those that are strong and well developed. The great length of the roots is often shown by trees which send up many suckers, as the silver poplar and locust, which may be seen to extend over a circle much greater in diameter than the height of the tree.

Many persons "wonder" why trees are so much checked in growth by common transplanting, or why they so often die from the operation. They would not be surprised, if they saw

the common destruction of the roots in taking them up. Figs. 100 and 102 represent a nursery tree with its roots entire; the dotted lines show where the spade is commonly set for the purpose of lifting; Fig. 98 is the tree after taken up, when more than nine-tenths of the roots are cut off—sometimes it is as badly mutilated as in Fig. 99. Fig. 101 exhibits the same as removed by careful nurserymen.

In late years, a new body of advice respecting the trimming of transplanted trees has come into vogue. It is the String-fellow or stub-root system.

It advises that the roots be cut to mere stubs, and that the tops be cut to sharp sticks or whips. The theory is that trees which are so reduced in bulk approach nearer to the condition of a seedling, and that the resulting trees are better. Experiments show the operation to be sometimes good, sometimes not. It depends upon conditions. Probably it cannot be recommended as a general practice.



FIG 102. Cutting of the Roots in Transplanting.

In ordinary or even very careful practice, a part of this wide network of fibres must necessarily be separated from the tree. It is evident then, that the usual supplies of sap to the leaves must be in part cut off. Now the leaves are constantly (during day) throwing off insensible moisture into the air; and good-sized trees thus give off daily many pounds. Reduce the supply from below, and the leaves cannot flourish; and if the reduction is severe, the tree withers and dies.

The remedy consists in lessening the number of leaves, so as to correspond with the diminished supply. This may be done by shortening back every shoot of the previous year to one-quarter of its length, and in extreme cases every shoot may be shortened back to *one strong bud*, just above the previous year's wood. Cutting off large branches at random often quite spoils the shape. Fig. 103 represents an un-

pruned tree, and Fig. 105 the same with the shoots shortened back.

Where peach and other trees have been once a year trimmed up to a single stem, while in the nursery, the mode of shortening is shown by Figs. 105 and 106.

A few experiments only are needed to convince any one of the advantages of thus cutting in the shoots. Some years ago an orchardist carefully transplanted one hundred and eighty apple-trees into good mellow soil. The roots had been cut rather short in digging. One-half had their tops shortened back, so as to leave only one bud of the previous season's wood,

the heads of the other half were suffered to remain untouched. The season proved favorable. Of the ninety which had their heads pruned, only *two* died, and nearly all made fine shoots, many being eighteen inches long. Of the ninety unpruned, *eight* died;

most of them made but little growth, and none more than six inches. Both the first and second year, the deep green and luxuriant foliage of the pruned trees afforded a strong contrast with the paler and more



FIG. 104. Pear-Tree Pruned.



FIG. 103.—Three-Year-Old Pear-Tree.

feeble appearance of the others. A similar experiment was made with seventy-eight peach-trees, of large size, three years' growth from the bud. One-half were headed back; the rest were

unpruned. The season was rather dry, and *twelve* of the thirty-nine unpruned trees perished; and only *one* of those which were headed back. The unpruned which survived lost parts or the whole of the upper portions of their branches; the pruned made fine bushy heads of new shoots. In another instance, trees only one year's growth from the bud, transplanted in the usual manner unpruned, were placed side by side with others of four years' growth, and with trunks an inch and a half in diameter, the heads being pruned to one quarter their size. The growth of the former was feeble; the large trees, with pruned heads, grew vigorously.

The degree to which this shortening should be carried must depend much on climate. In the cool, moist atmosphere of England, the leaves perspire less, and a larger number may remain without exhausting the supply from the roots.

In this country the perspiration is more rapid, and fewer leaves can be fed, until new roots furnish increased supplies.

Cutting back after the buds have swollen, or the leaves expanded, often checks growth, and usually should not be performed except on very small trees, or on such as the peach, which quickly reproduce new shoots.

Trees which quickly reproduce new shoots, as the peach,



FIG. 105.—Yearling Peach-Tree.



FIG. 106.—Peach-Tree, Pruned.

may be more closely shortened back than others having a less reproductive power, as the apple. The cherry throws out a new growth still more reluctantly, and hence more care is needed in digging up the roots entire.

Preparing the roots.—Before a tree is set in the earth, all the bruised or wounded parts, where cut with the spade, should be pared off smoothly, to prevent decay, and to enable them to heal over by granulations during the growth of the tree. Then dip them in a bed of mud, which will coat every part over evenly, and leave no portion in contact with air, which accidentally might not be reached by the earth in filling the hole. The bed of mud is quickly made by pouring into a hole a pail of water, and mixing it with the soil.

Setting the tree.—It should not be set deeper than it stood before removal, unless the land is newly ploughed, and is likely to settle away from the tree. Setting upon the surface without any hole, and placing fine earth upon the roots to the usual depth, is allowable on shallow or unprepared soils. When placed in the unfilled hole, if it is found to be too deeply sunk, a mound or hillock is to be made under the centre to raise it sufficiently, and the roots separated and extended to their full length. Fine rich mould is then to be sprinkled or sifted over, taking care to fill all the interstices, and using the fingers to spread out all the fibres during the operation. The mellow earth should rise two or three inches above the surrounding surface, to allow for its subsequent settling.

Stiffening against the winds.—Newly-planted trees, being acted on as levers by the wind, often press aside the earth about their stems, and make an opening down to the roots, which in consequence suffer from both drouth and disturbance. There are two ways to prevent this disaster. In autumn transplanting, the best way is to embank a mound of earth about the stems, from ten to eighteen inches high, as the size of the tree may require, Fig. 107. This mound performs the triple office of stiffening the tree, excluding mice, and covering the roots from frost. Only a few seconds are required to throw up one of these conical heaps of earth. After the tree commences growing, the mounds are removed. Trees which have had their heads lightened by the shorten-

ing process already described will not often need any other protection.

But when the trees are large, or the situation is windy, *staking* becomes necessary. If driven before the roots are covered, the stakes may be erect, as in Fig. 108; if driven afterward, they



FIG. 107.



FIG. 108.



FIG. 109.

Mounding and Staking Trees.

may be slanting; and in both cases straw bands should be first wrapped once round, to prevent the trees from chafing.

The accompanying figure (109) shows the mode in which the stake is driven into the bottom of the hole before filling in.

Transplanting trees on the surface.—On the last page the advantages are pointed out of sometimes setting trees on the sur-

face of the soil. This mode of transplanting is undoubtedly the best on all heavy soils that cannot be thoroughly drained. The annexed figure (110) exhibits distinctly this mode of planting, the dotted line indicating the common surface of the earth, on which the tree is set, and the low mound raised upon the roots.



FIG. 110—Planting on the Surface.

This gives the roots a deeper

soil. By throwing the furrows occasionally toward the rows, the raised surface will be maintained. This method is not adapted to large commercial orchards, but for home grounds.

Watering.—A very common error is the belief that trees need frequent watering before they are in leaf. Deluging the roots while in a partially dormant state is as hurtful to trees as to greenhouse plants, and a continued repetition of it is almost certain death. When a plant is in a state of rapid vegetation, large quantities of moisture are drawn up by the leaves and thrown off; but while the buds are unexpanded, the amount consumed is very small. Fruit-trees sometimes remain with fresh and green branches, but with unswollen buds, till midsummer. Instead of watering such at the roots, let the tops be wet daily at evening, and it will in nearly all cases bring them into active growth. When the tree is much shrivelled, wrapping it loosely in straw, or better in moss, and keeping the whole in a damp state, will in most cases restore it.

After the leaves are expanded, a more copious application of water becomes useful; but it should never be performed, as so frequently done, by flooding the tree at one time and allowing it to dry at another; or by pouring the water on the surface, which it hardens, and never reaches the roots. Keeping the soil finely pulverized, and, if necessary, with an additional shading of hay or straw thickly spread over the surface, will preserve a sufficient and uniform degree of moisture.

Watering the roots, even of fast-growing trees, will rarely become needful if the soil is deep and is kept mellow. But whenever it is performed, the surface earth should be thrown off, the water poured in, and the earth replaced. This will admit the water at once to the roots, and leave the surface mellow; while by watering the top of the ground, the water will perhaps fail to reach the dry soil below, but only serve to harden and bake the surface.

Mulching, or covering the ground about a tree with straw, coarse barnyard litter, or, what is still better, leaves from the woods, will in nearly all cases obviate the necessity of watering. It is an excellent protection against midsummer drouths, which so often prove destructive to newly transplanted trees after they have appeared in leaf, and is a good substitute for mellow culture in places where good cultivation cannot be given. It should never be omitted for newly set cherry-trees. A correspondent of the *Horticulturist* mulched fifty trees out

of one hundred and fifty, all of which had commenced growth alike. Those which were mulched all lived. Of the hundred not mulched, fifteen perished. The weather was hot and dry at midsummer.

Trees received from a distance, and injured by drying, should immediately have their roots coated by immersion in a bed of mud; and then the whole stems and branches buried in moderately moist earth for a few days. They will gradually absorb moisture, through the pores in the bark.

SEASON FOR TRANSPLANTING.

Nearly all deciduous trees may be removed from the soil at any time between the cessation of growth in autumn and the swelling of the buds the following spring. The operation may be performed first in autumn with those which drop their leaves soonest; but any tree, when not growing, may, by stripping its leaves, be removed safely. If left on, they will invariably cause the shrivelling of the bark, in consequence of the large amount of moisture they are always exhaling, and which cannot be restored through the roots.

The rule must vary somewhat with circumstances. Tender trees, as the peach and apricot generally succeed best if set in spring, unless in a warm, dry soil in a sheltered place, and in a climate not severe. It may be added, that soils rather wet, or liable to become soaked with water before freezing, should never receive trees in autumn. The rule should be carried one step farther; such soil should never be set with trees at all. They are unfit until well drained. Much of the "bad luck" that occurs is from wet subsoils.

It is commonly best to dig up trees in the autumn from nurseries in any case, whether for fall or spring setting. If sent long distances, they will be on hand and may be sent out early. They may be heeled in, and be more effectually secured from freezing, than if standing in the nursery rows. In heeling in, select a dry, clean, mellow piece of ground, with no grass near to invite mice; dig a wide trench, lay in the roots sloping (Fig. 111) and cover them and half the stems with fine mellow earth; *fill in carefully and solid all the interstices among the roots*; doing this work imperfectly often results in loss; if well

performed, it never can. If much danger is feared from mice, it is better to place the trees erect in the trench (Fig. 112), and round up the whole surface about them; but, being more exposed in this position, they should be placed in a sheltered situation from the winds.

With the precautions above mentioned, it is, however, a matter of small consequence at which season trees are put out, provided the work is well done. It is *at least a hundred times more important to give them good mellow cultivation afterward.*



FIG. 111.—Heeling-in Sloping.



FIG. 112.—Heeling-in Erect.

Here is where so many fail. Some dig little circles about their trees, which is scarcely better. The whole surface must be cultivated. It is for this reason that trees often do best set in spring—because in one case the soil settles, hardens, and crusts through winter, but is left mellow after spring setting. This difference could not exist if the mellowing of the soil were properly attended to.

When the soil is a heavy clay, and holds water like a tub, tender trees are in great danger from autumn transplanting, unless provision is made for draining the holes, which may be effected by running a deep furrow from one hole to the other, along the line of trees, and using brush, corn-stalks, or straw, as a temporary underdrain for the water to soak away.

Transplanting may be performed in winter, whenever the ground is open and the air above freezing; but roots which are frozen while out of the ground will perish unless they are buried before thawing.

The *size* for transplanting must vary with circumstances. Five to six feet high is commonly large enough, but those

much larger may be successfully removed if they have been previously prepared by shortening the long roots to induce the emission of a mass of smaller fibres near the centre or stem. This is done one year previously, by running a spade into the earth in a circle about the foot of the stem, if the tree yet stands in the nursery, or by cutting a circular trench around the tree if it is a large standard in open ground.

SUMMARY OF ESSENTIALS FOR TRANSPLANTING.

1. A previous preparation of a rich deep bed of mellow earth to receive the roots, and land which cannot be water-soaked.
2. Removing the tree with little mutilation of the roots.
3. Paring off the bruised parts.
4. Shortening-in the head, in a greater or less degree (before the buds swell), to correspond with the necessary loss of roots.
5. Immersing the roots in mud.
6. Filling the fine earth carefully among the roots, spreading them all out with the fingers.
7. Planting little or no deeper than before.
8. Staking or embanking, when necessary, to prevent injury by the wind.
9. Watering the stems and branches only, before the appearance of the leaf.
10. Mulching, where danger of midsummer drouth is feared.

The following additional rules, self-evident to men of experience, are continually disregarded by novices in setting out orchards and fruit gardens:

1. If the roots of a tree are frozen out of the ground, and thawed again in contact with air, the tree is killed.
2. If the frozen roots are well buried, filling all cavities before thawing any at all, the tree is uninjured.
3. Manure should never be placed in contact with the roots of a tree, in setting it out, but old finely pulverized earthy compost answers well.
4. A small or moderate sized tree at the time of transplanting will usually become large and bearing sooner than a larger tree set out at the same time, and which is checked in growth by removal.
5. To guard against mice in winter with perfect success,

make a small, compact, smooth earth mound nearly a foot high, around the stem of each young orchard tree.

6. The roots of a tree extend nearly as far on each side as the height of the tree; and hence to dig it up by cutting a circle with a spade half a foot in diameter, cuts off more than nine-tenths of the roots.

7. Watering a tree in dry weather affords but temporary relief, and often does more harm than good, by crusting the surface. Keeping the surface constantly mellow is much more valuable and important—or if this cannot be done, mulch well. If watering is ever done from necessity, remove the top earth, pour in the water, and then replace the earth—then mulch, or keep the surface very mellow.

8. Shrivelled trees may be made plump before planting, by covering tops and all with earth for several days.

9. Young trees may be manured to great advantage by spreading manure over the roots as far as they extend, or over a circle whose radius is equal to the height of the tree, in autumn or early winter, and spading this manure in spring.

10. Never set young trees in a grass field, or among wheat, or other sowed grain. Clover is still worse, as the roots grow deep, and rob the tree-roots. The whole surface should be clean and mellow; or if any crops are suffered, they should be potatoes, carrots, turnips, or other low-hoed crops.

11. Constant, clean, and mellow cultivation is absolutely necessary at all times for the successful growth of the peach-tree, at any age; it is as necessary for a young plum-tree, but not quite so much so for an old one; it is nearly as essential for a young apple-tree, but much less so for an old orchard; and still less necessary for a middle-aged cherry-tree.

DISTANCES FOR PLANTING TREES.

Persons about to plant orchards and fruit-gardens are often at a loss to know the most suitable distances to place the trees. The guiding rule should be to allow space enough that when the trees attain full size, the sun's rays may freely enter on each side. The roots as well as the tops should have free space. As a general rule, the tops should never approach nearer than one-half their diameter.

Some varieties of the same kind of fruit grow to a much greater size than others, but as an average the following distances may be adopted:

Apples.—In fertile districts of the country, where the trees may attain great size, and where there is plenty of land, forty feet is the greatest distance required. The usual distance is two rods or thirty-three feet. Where the most is to be made of the land, and where heading-in the limbs is practised when the trees become too large, twenty-five feet distance may be adopted. It is an economical plan to set apples thirty feet apart and a pear between; for ten or fifteen years, at least, they can all grow together, and if then too thick such as are least desirable may be cut out. It saves much room and gives more fruit to the acre while growing. For pyramids on apple-stocks, fifteen feet; for pyramids or dwarf standards on Doucin stocks, ten feet; for dwarf round-headed trees on Paradise stocks, eight feet.

Pears.—Large growing standard varieties, on pear-stocks, twenty to twenty-five feet; dwarf standards on quince (with stems pruned up, two or three feet, the heads with natural growth, or slightly thinned by pruning but once a year, for orchard culture), twelve feet; pyramids on pear stocks, twelve to fifteen feet; on quince, ten or twelve feet. It should never be forgotten that pears on quince should be so placed as to admit of high or enriching cultivation.

Peaches.—It is usual to allow about twenty feet for peach-trees that are never shortened-in, but permitted to spread out and take their natural course. But if shortened-in annually as they should be, or even triennially, by cutting back three-year branches, they may occupy only twelve or fifteen feet. Peach-trees budded on the plum, which reduces their growth a little, may be kept cut back so as to require a space of only eight or nine feet.

Cherries.—Common standards, twenty feet apart; pyramids on common stocks, fifteen feet; on Mahaleb stocks, ten feet. Dukes and Morellos require only three-fourths of this space.

Plums.—Standards, eighteen feet; pyramids, eight to ten feet.

Apricots.—Somewhat more space than for plums.

Quinces.—Eight to twelve feet.

Grapes.—Most vigorously growing native sorts, on enriched soils, may be ten to fifteen feet apart; on a poorer soil, moderate growers may be six to eight feet apart. The most usual distance for Concord is nine feet.

Gooseberries and Currants.—Four to five feet.

Raspberries.—Four to six feet in rows five feet apart.

Blackberries.—In rows five to nine feet apart.

For the above distances, the following is the number of trees required for an acre:

40 feet apart,	.	.	.	.	.	27 trees.
33 "	.	.	.	.	.	40 "
25 "	.	.	.	.	.	69 "
20 "	.	.	.	.	.	108 "
15 "	.	.	.	.	.	193 "
12 "	.	.	.	.	.	302 "
10 "	.	.	.	.	.	435 "
8 "	.	.	.	.	.	680 "
6 "	.	.	.	.	.	1,208 "
4 "	.	.	.	.	.	2,720 "

REGISTERING ORCHARDS.

Much inconvenience and often many mistakes arise from not preserving the names of varieties in young orchards. The trees are received, correctly labelled, from the nursery; the labels are left on till the wires cut the limbs, or until effaced by time, and the sorts are forgotten. Always draw on paper a plan of the orchard, marking the place of each tree and its name; it saves much subsequent confusion when labels are lost.

CHAPTER VI.

CULTIVATION OF THE SOIL.

IN passing through the country, and visiting the grounds of fruit-growers, and examining the exhibitions of pomological societies, a marked difference is observed in the same variety as grown on different grounds. In one case it is small and poor flavored; in another it is large, beautiful, rich, and excellent. The owner of the poor fruit is much disappointed in what he expected to see, and considers himself as "badly humbugged" by the nurseryman who sold him the trees. The successful cultivator takes his specimens to a fair, and sweeps off the premiums by their delicious quality and excellent appearance. Now, this question at once arises: What is the cause of this difference? And it is just such questions as we like to hear asked.

The first, and perhaps the most prominent cause, is *cultivation*. Place a tree in grass-land, or give it no cultivation—let the surface become baked hard, like flagging, or allow weeds to cover the surface—and the tree will have a feeble growth, and the fruit, as a necessary consequence, will partake of the condition of the tree. A feeble tree will, of course, bear small fruit. Hence, one reason why young trees often produce larger and finer specimens than old and stunted trees. Cultivation alone has often changed both size and quality in a surprising degree. Some years ago a few trees of the Seckel pear were observed to bear very small fruit—they were then standing in grass. Subsequently the whole surface was subjected to good cultivation. The next crop had pears at least triple the size of the former. A St. Ghislain tree, on another place, bore at first when standing in grass-land, and disappointment was felt by the owner at the small size and poor quality of the fruit. A herd of swine accidentally rooted up the grass and reduced the ground to a mellow surface. The pears that year were

greatly increased in size, and so much improved in flavor that they would not have been recognized as the same sort. The d'Angouleme when large and well grown, is an excellent fruit. When small, it is perfectly worthless. T. G. Yeomans, of Walworth, N. Y., who has been eminently successful in its cultivation, and obtained thirty-five dollars per barrel for it, has found high culture of vital importance, and has remarked that when the specimen does not weigh over four ounces, it is no better than a raw potato; and this, we think, has generally been found true. There is no question whatever that this fine pear, as well as many other fruits, has been placed on the rejected list by some planters for want of good management and proper cultivation.

Good cultivation and thinning the crop cause all the difference between those superb specimens of the pear which often grace the extended tables and fill the vast halls of our finest fruit exhibitions, and such miserable fruit as we sometimes see borne on the grass-grown, weed-choked, mice-gnawed trees of the slipshod farmer's grounds—planted out with hardly the expectation, but rather with a sort of dim hope that they would grow and take care wholly of themselves.

One of the best things that a horticultural or pomological society could do, would be to place conspicuously on exhibition a collection of such fruit as might be raised with every advantage resulting from good culture and judicious thinning; and another collection beside it with all the marks of small size and scabbiness which might be expected from utter neglect. One collection should be marked, "FRUIT RAISED UNDER THE EYE OF VIGILANCE AND INDUSTRY:" the other labelled, "FRUIT GROWN UNDER NEGLECT."

Cultivation is the more important, because it is not commenced and finished in a day, but needs constant attention for years; and in ordinary practice it receives greater neglect. For, of the thousands of trees which are every year transplanted in all parts of the country, the assertion may be made with safety, that *more are lost from neglected after-culture than from all other causes put together.*

To purchase and set out fine fruit-trees of rare sorts, in a baked and hardened soil, whose entire moisture and fertility are consumed by a crop of weeds and grass, might very aptly

and without exaggeration be compared to the purchase of a fine horse, and then perpetually to exclude him from food and drink.

Here is the great and fatal error with a large portion who attempt the cultivation of fruit. We may not incorrectly divide these into three classes:

1. Those who, having procured their trees, destroy them at once by drying them in the sun or wind, or freezing them in the cold, before setting out.

2. Those who destroy them by crowding the roots into small holes cut out of a sod, where, if they live, they maintain a



FIG. 113.—Neglected Trees.



FIG. 114.—Well Cultivated Orchard.

stunted and feeble existence, like the half-starved cattle of a neglectful farmer.

3. Others set them out well, and then consider their labors as having closed. They are subsequently suffered to become choked with grass, weeds, or crops of grain—some live and linger, others die under the hardship; or else are demolished by cattle, or broken down by the team which cultivates the ground.

The annexed illustrations are a fair exhibition of the difference in results between neglected management, as seen on the left, and good cultivation, on the right, as seen in trees five or ten years after transplanting (Figs. 113 and 114).

A neighbor purchased fifty fine peach-trees, handsomely rooted, and of vigorous growth; they were well set out in a field containing a fine crop of heavy clover and timothy. The following summer was dry; and a luxuriant growth of meadow-grass nearly hid them from sight. What was the consequence? Their fate was precisely what every farmer would have predicted of as many hills of corn, planted and overgrown in a thick meadow—very few survived the first year.

Another person bought sixty, of worse quality in growth; he

set them out well, and kept them well hoed with potatoes. He lost but one tree; and continuing to cultivate them with low-hoed crops, they now afford yearly loads of rich peaches.

Another neighbor procured fifty good trees. Passing his house the same year late in summer, he remarked: "I thought a crop of wheat one of the best for young peach-trees!" "Just the reverse; it is one of the worst—all sown crops are injurious; all low-hoed ones beneficial." "Well," answered he, "I have found it so—my fifty trees all lived, it is true, but I have lost one year of their growth by my want of knowledge." On examination, they were found in excellent soil, and had been well set out. All the rows were in a field of wheat, except one, which was hoed with a crop of potatoes. The result was striking. Of the trees that stood among the wheat, some had made shoots the same year an inch long, some two inches, and a very few, five or six inches. While on nearly every one that grew with the potatoes, new shoots a foot and a half long could be found, and on some the growth had been two feet, two and a half, and even three feet. Other cases have furnished nearly as decisive contrasts. An eminent cultivator of fine fruit, whose trees have borne for many years, remarks: "My garden would be worth twice as much as it is if the trees had been planted in thick rows two rods apart, so that I could have cultivated them with the plough. Unless fruit grows on thrifty trees, we can form no proper judgment of it. Some that we have cultivated this season, after a long neglect, seem like *new kinds*, and the flavor is in proportion to the size."

The *thick rows* here alluded to may be composed of trees from six to twelve feet apart in the rows. This mode admits of deep and thorough cultivation, and the team can pass freely in one direction, until close to the row, where the soil need not be turned up so deeply so as to injure the roots. Fig. 115 exhibits this mode of planting, and Fig. 116 another mode, where the trees are in hexagons, or in the corners of equilateral triangles, and are thus more equally distributed over the ground than by any other arrangement. They may thus be cultivated in three directions. For landscape effect, this is undoubtedly better than any other regular order.

Trees are frequently mutilated in cultivating the ground with a team; to obviate this difficulty. arrange the horses

when they work near the line of trees, one before the other, or *tandem*. Let a boy ride the forward one. use long traces and a *short whiffletree*, and place the whole in the charge of a careful man who knows that one tree is worth more than fifty hills of corn or potatoes, and no danger need be feared. In



FIG. 115.



FIG. 116.

the absence of this arrangement, oxen will be safer than horses. A strong single horse will be sufficient for working near the rows, where the plough should run shallow, provided the soil is not hard.

The annexed cut (Fig. 117) shows a mode of constructing whiffletrees for this purpose, so as to pass the trees freely.



FIG. 117.—Orchard Whiffletree.

It is made as short as the free action of the animals' legs will allow (about sixteen inches for a single whiffletree). An iron strap is riveted so as to bend round the end of the wood, turning in and forming a hook inside.

In very small trees, most of the roots are within a few feet of the stem, but their circumference forms an annually increasing circle. Hence the frequent practice of applying manure, or digging the ground closely about the base, as exhibited in the annexed figure (118), is comparatively useless. Hence, too, the practice of ploughing a few furrows only on each side of a row of large trees in an orchard, is greatly inferior to the cultivation of the whole surface.

Among the crops which are best suited to young trees are potatoes, ruta-bagas, beets, carrots, beans, and all low-hoed crops. Indian corn with its shallow and spreading roots, and the culture usually given it, is a good crop for orchards. All sown crops are to be avoided, and grass is still worse. Meadows are ruinous.

A chief reason of the fatal effects of sown crops is in the

impossibility of mellowing the ground by repeated cultivation. For this reason, a low crop of peas has been found much worse than a heavy growth of Indian corn.

Renovating Old Trees.—When old trees become feeble, there



FIG. 118.—Faulty Manuring.

is no better way of imparting to them vigor than by *manuring*. Instead of adopting the more common practice of digging a circular trench around them and filling this with manure, the operation may be performed in a more perfect and efficient manner by digging narrow radiating trenches from within a few feet of the trunk, directly from it—this will prevent cutting many of the roots. The annexed diagram (Fig. 119) will show the position of these trenches. These may then be filled with a *compost* made of turf, stable manure, ashes, and perhaps a little bone manure—the turf to be the chief constituent, say one-half or two-thirds—and the ashes say one-thirtieth. The bone manure is not essential, as its constituent parts are in common manure in small quantities. If this is done in autumn, the roots will be prepared to penetrate it early in spring, and if the tree is not past recovery, it may make a new growth.



FIG. 119.—Diagram for Trenches for Renovating Old Trees.

The roots probably reach as far each way as the height of the tree, and the trenches should extend about the same distance. They need not be cut very near the tree, as the roots are all large there, and would be more likely to be injured and would be little benefited. The trenches should be only the width of a spade, and be from two to four feet apart.

Old apple orchards always grow and bear best when kept under cultivation. If the soil is, however, naturally or artificially fertile, they succeed well in grass continually grazed short by sheep and swine. These animals are useful in devouring the insects of the fallen fruit, and assist in manuring the surface. An annual autumn application of yard or stable manure, with a small portion of ashes—or, in the absence of ashes, of lime—will commonly be useful. If the orchard is only top-dressed, the application in autumn is of great importance, that the soil may be soaked in winter or spring. If ploughed in it should be done in spring, after the manure has remained all winter on the surface.

When to Manure Orchards.—Inquiry is often made as to the frequency and amount of manuring or cultivation for trees. The answer must be: *act according to circumstances.* The question again recurs: how shall we know what our soils need? The answer is: *observe the results of growth.* An examination or analysis of the soil will be of little use. But the trees will tell their own story. If the soil is so rich that they make annual shoots of two or three feet or more in length, without any cultivation or manuring at all (which, however, is rarely the case), then it will be needless to give additional care. *The annual growth is the best guide to treatment.* There are very few apple or other orchards which, after reaching a good bearing state, throw out annual shoots more than a foot or a foot and a half long, and many not half this length. The owner may lay it down as an unalterable rule, that when his trees do not grow one foot annually, they need more manuring or cultivation, or both. By observing the growth he can answer all questions of the kind referred to, without difficulty.

Management of Western Orchards.—Lewis Ellsworth, one of the most successful and intelligent fruit-growers in Illinois, says that the loss in fruit-trees in that State within the last three years is *millions of dollars*—that it is attributed to the

cold winters and dry summers. But he asserts that, to a great extent, this result has arisen from their standing *unprotected* in a soil underlaid with a retentive clayey-loam subsoil, which characterizes most of the prairie land. He has adopted the practice of ridging his land, by repeated ploughings, commencing at the same ridges and ending at the same dead furrows; and where nursery-trees were formerly thrown out by freezing, after ridging they stand throughout the winter without injury, and make a better growth in summer. He recommends the ridging system for all orchards, each row of trees being placed on the centre of the ridge.

We have no doubt that drainage would lessen the effects of severe winters on fruit-trees in other regions than the West.

It is explained that good cultivation improves land in three ways: by improving the physical texture of the soil; by saving moisture; by increasing or accelerating chemical activities.

Arrangements to Facilitate Cultivation.—The following is an arrangement of kinds of different sizes, into rows for cultiva-



FIG. 120.—Fruit-Garden.

tion both ways with horse-labor (Fig. 120). The larger sorts are in wide rows, as explained on page 143. Fruits which are stung by the *curculio* are planted at one end, and when the fruit is forming, pigs and geese are confined to that part by the hurdle-fence *a a*, run across for the occasion.

A plan of a fruit-garden, arranged in a similar manner, with full details, is given on page 142.

THE MODERN CULTIVATION OF COMMERCIAL ORCHARDS.

The methods of handling commercial orchards have changed greatly within the past few years. The old bugbear of ploughing and tilling orchards has been very largely overcome by the modern implements of tillage and by truer notions of the methods of caring for the orchard. All good orchardists now accept the fact that tillage is the fundamental treatment for an orchard, and that sod is the exception. Sod is to be used only in special cases. The philosophy of the tilling of an orchard is to keep the land well and deeply prepared during the first few years, in order to make the roots strike deep, and thereafter to maintain a loose surface in order to save the moisture. If the land has been well cared for in the first four or five years of the orchard, it will rarely be necessary to plough deep thereafter. After the trees have grown three to six years, the position of the roots is established, and the land should be in such condition that deep ploughing is not necessary to improve its physical texture. Tillage thereafter consists mostly in keeping the surface clean of weeds, and particularly in keeping the upper three or four inches mellow that it may prevent the free access of the air to the moist layers of the soil. This loose surface has been called the "earth-mulch." Of itself it may be dust-dry; yet, it interposes a layer of mulch between the moist earth and the air, and thereby saves very much of the soil moisture.

On most lands which have been well tilled in the first few years of the orchard, the only necessity for subsequent deep ploughing is to turn under some green-manure crop. Continuous clean tillage tends to deprive the soil of its humus of vegetable mould. This humus may be added in the shape of stable manure, but since most farmers have not sufficient manure, it is the modern idea to recommend that some green crop be grown on the orchard late in the season and ploughed under early the next spring. This supplies the vegetable mould and preserves the physical texture and general comfort of the plant. This allows the clean tillage of the plantation early in the season, and then the growing of rye, crimson clover, peas, or some other crop in late summer and fall. It is impor-

tant that tillage be begun very early in the season in order to conserve the moisture which has been stored up from the winter rains and snows, and also to facilitate the growth of the trees. The growth of fruit-trees takes place very early in the season. Tillage may cease by midsummer or August in most cases, although if the orchard is carrying a heavy crop and if the land is somewhat dry, surface tillage should be maintained later than that in order to hold the moisture. A heavy crop of peaches may often suffer if tillage is withheld at midsummer.

It will be seen from the above remarks that all the heavy ploughing work in the orchard is to be done when the trees are small. Therefore the old difficulty of tearing up the roots of old trees and breaking their tops by heavy ploughing is obviated. The surface tillage is done by light tools like smoothing harrows, spring-tooth harrows, and the like, and they may cut so broad a swath that the team does not need to be driven within several feet of the trunks of the trees. Whenever one sees a farmer laboriously breaking up an old orchard, he may be sure that the plantation has not been well cared for. He is trying as well as he can to correct the mistakes of the earlier years, although he may not himself understand why he has got into such difficulty.

In modern practice, orchard lands are rarely ever prepared with the subsoil plough. Lands which are greatly in need of subsoiling are usually not adapted to the growing of fruits. Or, if they are otherwise adapted, the best treatment is to tile-drain them. This is a permanent corrective, since it lowers the water table and breaks up the hardpan. Subsoiling is only a temporary corrective, as a rule. However, if land is thoroughly subsoiled when trees are set, the trees may be able to send their roots into the hardpan before it returns to its original dense condition. One or two crops of red clover will tend to improve its condition, because the tap-roots extend far into the soil.

It was the old notion to plough one year to the trees and one year from the trees in order to keep the land more or less level. With the modern harrowing tools, however, it is easy to work the soil away from the trees, and thereby to keep a level surface, even though the furrows are thrown toward the

trees each year. In general, it may be said that deep ploughing is advisable in an orchard only in the first few years of its life, as already said; and thereafter it is rarely necessary to plough deep.

If an orchard has not been well ploughed and tilled in the early years, the roots will be so high that deep ploughing is practically impossible when the trees come to maturity. In that case, the effort should be, as a rule, to prepare a surface mulch by bringing the top layer of soil into a fine and mellow condition. This may be done by a shallow ploughing or by cutting up the surface with a spading harrow. Even heavy sod can sometimes be cut and lacerated by a spading harrow, if the work is done in spring when the land is soft and moist.

In general, it is best to plough orchard lands in spring rather than in fall, since the roots are not exposed; the spring ploughing allows the green crop to remain upon the land during the winter, thereby holding some of the rainfall and preventing the surface from cementing and from washing. Fall ploughing is generally to be discouraged in peaches and other tender fruits, particularly at the North. When land is very heavy or clayey, however, fall ploughing may be a decided advantage in order to allow of the weathering of the land. In very hard clays, it is generally important that the land have a covering of stubble, manure, or some other fibrous material, to prevent the snows and rains of winter from cementing or puddling it. If one has much land to plough, and is short of team help, he may plough his apple-orchards and other hardy fruits in the fall in order to be forehanded with his work. But, as before said, the heavy ploughing of an orchard, except for turning out a green crop, should not be necessary after the orchard is a few years old.

Crops which are used for temporary green manures and protection in the orchard have latterly been called *cover-crops*. The seed is usually sown at the last tilling in July, August, or very early September. These cover-crops are usually divided into two groups—those which have the power of fixing atmospheric nitrogen (leguminous crops), and those which do not have this power. To the former class belong all the peas and beans, vetch, clovers, and alfalfa. The latter

class, including rye and oats, buckwheat, corn, and other cereals, may not add plant-food to the soil, but the rotting of the tissues affords vegetable mould or humus, and therefore may greatly improve the land. By holding the snow and preventing the washing by rains, and by preventing the cementing of hard soils, they may also exert a distinctly beneficial mechanical influence. It is an easy matter to use too freely of leguminous crops, since one is likely to secure too much nitrogen, and induce too large a growth. This is particularly true with grapes, peaches, and various tender fruits. For hard and rough soils, the best general cover in the North is rye, and in the South cow-peas. In the North, the crimson clover may be used now and then, but it is successful, as a rule, only on lands which are fairly rich and fine, in which the plant is able to secure a good foothold comparatively early in the fall. Whether one shall use a cover-crop every year depends upon the condition of his land and his trees. The orchardist will have to determine that point for himself.

FERTILIZERS.

The old notion that the chemist can analyze the soil and then tell what kind of fertilizer, and how much, shall be applied to it, is now given up. The chemist can tell what is in the soil, but in the Northern States, where the soil is largely composed of drift, the land is usually not sufficiently uniform to enable the chemist to get a representative sample of the whole field. Judicious and thorough tillage will unlock much of the plant-food which the chemist finds to be unavailable. The chemist can give hints and suggestions here and there, but only in exceptional cases can he give positive and specific directions.

As a rule, there are only three of the elements of plant-food which the fruit-grower needs to add to the soil—potash, phosphoric acid, and nitrogen. Good tillage may supply these, or at least make them available. If trees are not making a good growth and are of a yellow cast, one or all of three things is to be suspected: they may be attacked by borers or other difficulties; they may be suffering from lack of moisture; they may lack nitrogen. If the grower is satisfied that they

lack nitrogen, the addition of good stable manure, or the ploughing under of a leguminous crop may help matters; or, he may find it quicker and more economical to apply nitrogen in the form of nitrate of soda, sulphate of ammonia, or other material. The better the land is tilled, the quicker, as a rule, will be the results of such fertilizing, and the less material to be applied. From two to three hundred pounds to the acre is ordinarily considered to be sufficient. In a similar way the grower may experiment with the addition of potash and phosphoric acid. As a rule, from one to two hundred pounds per acre annually of high-grade muriate of potash and high-grade phosphatic materials will be sufficient. When land is not naturally well supplied with these materials, and when the crops are heavy, these applications may be increased. If truck-gardening crops or small fruits are raised between the trees, then the amount of fertilizer will need to be increased considerably.

The reader who intends to do his best with his orchard should consult the bulletins of the various experiment stations on the above points.

CHAPTER VII.

PRINCIPLES AND PRACTICE OF PRUNING.

A GREAT deal has been said and written on this subject, and much bad practice still prevails. Orchards are seen all through the country which have either been never pruned or, if the work has been performed, it has done more harm than good. Trees with trunks trimmed up to three times the proper height, mutilated by the needless lopping of large branches, one-sided and totally destitute of symmetry, or filled with a mass of brush, may be seen through the country. A perfect orchard is a rarity. The same remark will apply to nurseries. The trees have been grown and trained with very little attention to a perfect shape, the chief object of the owner being to raise large trees in as little time as possible. The purchasers of such trees, after setting them out, either give little attention, or, if they cultivate them well, allow them to form their own heads. They may be too tall or one-sided, or distorted and irregular, no attention being given to shaping the heads when they are young.

Pruning Young Trees at Transplanting.—When young trees are dug from the ground, the roots from necessity are more or less bruised or mutilated. All these bruised or torn surfaces should be pared off smoothly with a sharp knife. If left untouched they induce decay, and are unfavorable to the best healthy growth of the tree—in the same way that a broken or bruised limb above ground would furnish a dead stub or make a bad scar, while pruning it smooth will cause it to heal over readily. Most nurserymen prefer the pruning-knife, Fig. 121. for trees at this stage of their growth, considering that it makes a cleaner cut—but the pruning-shears, Fig. 166, now made make a drawing cut, which leaves a clear and unbruised surface, and can be used much more rapidly.

Pruning the Tops.—Thrifty young trees usually have roots

extending as far each way from the foot of the stem as the height of the tree. A careful examination will discover the



FIG. 121.—Forms of Pruning-Knives.

whole surface of the subsoil occupied with the small fibres of full-grown nursery-trees (Fig. 122). It is obviously impossible, therefore, in digging up to avoid cutting and leaving most of



FIG. 122.—Nursery Rows—Roots extending under the whole surface.

the roots behind; and the tree when reset is unable to sustain or feed for a time its leaves and branches. A part must therefore be cut off to restore the balance, corresponding in some

degree with the loss of the roots. This may be done by thinning out all the feeble shoots, so as to leave an even, well-shaped head, and then cutting back a part of each remaining one-year shoot (Fig. 123). Judgment must be exercised as to



FIG. 123. — Figure of thinned and shortened - back young tree.

the amount to be cut away from the tops. The growth of new roots depends on the assistance afforded by the leaves at the top; if the leaves are too few, the roots will not extend freely; if they are too many, the roots cannot furnish proper supply for them, and they will be feeble and sickly. Planters will learn a great deal on this point by cutting away more or less on different trees, and observing the result. Different kinds of trees require varying management in this respect. The peach, for example, readily reproduces new shoots, and it may, consequently, be cut back very freely; two-thirds to nine-tenths of each previous season's shoot may be removed without detriment.

The grape, also, may be very heavily pruned, as it throws out new vines with great vigor. The cherry, on the contrary, is very sensitive, and young trees have been nearly killed by a severe summer pruning. The young cherry shoots should never be cut back in spring more than half their length. The pear and apple are intermediate, and the heads should be moderately and not severely pruned.

The mutual relation between the roots and leaves has been already alluded to. The leaves cannot exist without the moisture received through the roots; and the roots cannot grow without the nourishment afforded by the leaves. The only exception is the temporary supply furnished by the cells in the body of the tree. New roots are commenced before the leaves expand, as may be seen on young seedlings, the roots of which have been trimmed, and where the new white fibres protrude just as the buds are swelling. The same occurs on the roots of trees transplanted in autumn, after the leaves have fallen; but this effect is only temporary, continued growth requiring that both leaves and roots should work together. On the other hand, the nutriment laid up in the cells will sometimes supply the leaves for a short period, provided care is taken to furnish

the requisite moisture at their surfaces by means of a bell-glass to retain a damp atmosphere. Cuttings are often thus started, a small portion of leaves being allowed to remain upon them to assist in the emission of new roots. But, if the leaves are placed in a dry air, they soon pump out and carry off the moisture, and the shoot, leaves, and all, withers in a short time. If all the leaves had been cut off, the shoot would remain plump much longer—a fact well known to nurserymen and others who reserve scions for budding.

Proper Time for Pruning.—Many cultivators have been misled into the opinion that early summer is the best time to prune, from the fact that the wounds heal more readily. Pruning after the tree has commenced growth has a tendency in nearly every instance to check its vigor. For this reason, where the rapid formation of young wood is desired, the work must be performed *before the buds begin to swell*. Two questions are concerned in the choice of the proper time for pruning, the effect on fruit-bearing, and the effect on the healing of the wounds. As a rule, light summer pruning tends more to fruit formation than

does heavy winter pruning. On the other point the following advice is given (Bailey, "Pruning-Book"): "The conclusion—and my general opinion—in respect to season of pruning, so far as the healing of wounds is concerned, is this: The ideal time is in spring, before growth begins (late February, March, and early April, in New York), but more depends on the position of the wound in the tree, and the length of stub than on the time of year."

FIG. 125.—Head of Young Tree heavily pruned after the leaves had expanded.



FIG. 124.—Head of Young Tree pruned before the leaves had expanded.

If heavy pruning is to be done, the work is best done when the tree is dormant. See Figs. 124, 125. There may be an exception to this general rule, where a slight amount of pruning in summer, not sufficient to produce any

material check in growth, may be useful in improving the shape of the tree.

As fresh wounds always render trees more liable to be affected by intense cold, quite hardy trees only may be pruned any time during winter. On those inclining to be tender the operation should be deferred till toward spring.

Pruning, as Affecting Fruitfulness.—As a general rule the rapid formation of leaves and wood is adverse to the production of fruit. On the other hand, the slow growth of the wood favors the formation of fruit-buds and the production of heavy crops. These two adverse tendencies may be more or less controlled by pruning.

When the too numerous branches of a tree produce more leaves than can be properly supplied with nourishment, resulting in a feeble or diminished growth, new vigor may be often imparted by judicious pruning, directing the sap into a smaller number of channels, and thus increasing its force; for example—peach-trees, after bearing some years and yielding smaller fruit than on fresh young trees, will assume all their former thriftiness by partly cutting-back the heads. Dwarf pear-trees, which have not been sufficiently manured and cultivated, whose pruning has been neglected, and heavy bearing allowed for a number of years, have been restored by severely pruning-back the branches and thinning out the fruit-spurs. In all such operations as these, it is indispensable to observe the rule already given, to do the cutting-back in winter or early in spring, before the buds have swollen. If trees are too thrifty and do not bear, a check may be given, and many fruit-buds produced by a continued pinching-back during summer.

The production of fruit-buds may be accomplished artificially by checking the growth of vigorous trees; but such treatment, out of the ordinary course of nature, though sometimes useful, should be cautiously applied, as the first crop gives still another check, and often materially injures the tree and the quality of its subsequent crops.

Summer Pruning.—Another and an unobjectionable mode of attaining the same end, is *summer pruning*, which is effected by pinching off the soft ends of the side-shoots after they have made a few inches growth. In these the sap immediately accumulates, and a greater or less number of the young buds

upon the remainder of these shoots may tend to produce efficient fruit-buds. To prevent the breaking of these buds into new shoots by too great an accumulation of the sap, a partial outlet is left for its escape through the leading-shoot of the branch, which at the same time is affecting the desired enlargement of the tree. In the annexed figure (Fig. 126), a branch is represented with its side-shoots thus undergoing conversion into fruit-spurs, the dotted lines showing the position which these shoots would have taken if left unpinched.

It will be seen that two great objects are here attained—the fruitfulness of the tree, and the increased vigor of the leading-shoot, by directing the surplus sap to its growth.



FIG. 126.—Summer Pruning.

This constitutes essentially the art of *summer pruning* dwarf and pyramidal trees, more especially the pear and apple. It may be applied with advantage to young standards, to produce early fruitfulness.

It often happens, and especially when the pinching is done too early, that the new buds send out shoots a second time the same season. When this occurs, these second shoots are to be pinched in the same manner as the first, but shorter; and third ones, should they start, are to be similarly treated. The bruising given by pinching off with the thumb and finger is more apt to prevent this result than clipping with a sharp knife.

Giving Desired Form to Trees by Pruning.—A tree may be moulded into almost any desired shape by a proper use of the knife, or even by the rubbing and pinching process.* If a young tree from the nursery is too tall and slender, or has too high a top, it should not be altered much the first year after removal, but allowed to become tolerably established with its new set of roots. The second year it may be cut back freely (Figs. 127 and 128), taking care to leave buds for the formation of an evenly distributed head. Some kinds of trees will

* A late writer says: "The finest standard pear-trees we ever saw, had never had a knife or saw about them. The thumb and forefinger had only been used. Rub off all unnecessary buds that grow in a tree—and remove as they appear. This keeps the tree clean, and the growth in the proper channels. It is easily done."

bear cutting-back freely the same year they are removed, as for example, the peach, which, as already observed, readily produces new shoots. The same characteristic is possessed by the sugar-maple and some other trees, which, as many have observed, when planted along the borders of streets, and cut back to single poles, form heads at once of new branches.



FIG. 127.—Mode of Reducing the Height of a tall young tree by cutting at the dotted line.

When the tops are too low (which is rarely the case), the lower branches may be pruned off and the top carried up to any desired height. This should not be done until the stem has thickened sufficiently to sustain the top—the side-shoots always tending to increase the diameter of the stem which bears them. If the young tree possesses great luxuriance it may be desirable to throw more of the growth upward than these side-shoots would allow, if remaining till the



FIG. 128.—The same, after the operation is completed.

following spring, the usual time for pruning. In such a case the ends of the side-limbs may be clipped or pinched off, and a portion of the lower ones removed with the knife.

Pruning Nursery and Young Trees.—Brief suggestions have been already furnished on this subject in connection with the explanation of general principles. Directions of a more minute and practical character, and applicable to the different kinds of trees, will doubtless be useful and acceptable. It is of great importance that a tree be pruned right, on the start for the misplaced shoot, which might be easily rubbed off with the finger, when just beginning to grow, many ultimately become the heavy limb and the misshapen top.

Pruning Single Shoots.—Young shoots are cut back for various purposes, such as heading-down to an inserted bud, shortening-in those that are too long, or cutting out super-numeraries. It is important that even these simple operations

be rightly performed. 1. The cut is usually made with a sharp knife, which does the work smoother, better, and more completely at the control of the operator. 2. The cut surface should be as small as practicable, in order that it may heal over readily.

The two annexed figures show the right and the wrong way of doing this work, Fig. 129 being a well-made cut and Fig. 130 being one performed by a careless workman, exposing a large cut surface and leaving an inconvenient and sharp stub above the bud intended to grow.



FIG. 129. FIG. 130. FIG. 131. FIG. 132.

3. The cut should not be made too high above the bud, nor too near it. If too



FIG. 133.—Pruning Down to Insert Bud. — The dotted line, *a*, shows the proper place to make the cut—*b*, is too near the bud.



FIG. 134.—Tying up Rarely practised in commercial plantations.



FIG. 135.—Nursery-tree Pruned too High.

high above (Fig. 131), in the space between the buds or joints, this portion, not being fed by leaves, dies, and the wood must be afterward pruned again in order to make a

smooth stem. If the cut is made too near the bud, as in Fig. 132, the drying surface abstracts moisture and enfeebles the bud, which either fails to grow, or grows feebly. Trees that are soft and porous, as the peach and grape, should have more wood left above the bud, to prevent drying; and in pruning down to all inserted buds, it is generally safest to leave an inch or two until the young shoot has fairly commenced growing, when the



FIG. 136.—Well-formed Young Tree.



FIG. 137.—Unformed Tree.



FIG. 138.—Unformed Tree, left unpruned till older.

stump may be pared down close to it by a single draw-cut of a sharp knife, made sideways, so that the point of the knife may not strike the shoot (Figs. 133 and 134). 4. In shaping the heads of young trees, prune down to an *inside* bud, where an upright shoot is required; but prune down to an *outside* bud where a more horizontal or spreading growth is sought, as, for instance, in such vertical growers as the Northern Spy and Early Strawberry apple-trees.

Pruning Young Apple-Trees.—Directions have been already given in relation to forming a high or low top. In consequence of the crowded growth of nursery-trees, they are apt to push upward to reach the light, at the expense of the side-branches. In addition to this influence, being closely trimmed

on the sides to make them tall, such mismanaged trees assume the appearance of the annexed cut (Fig. 135), and have been compared to a low-bowing dancing-master. A better-shaped tree is shown in Fig. 136. As all nursery-trees succeed better, are more sure to live, and are more vigorous and make handsomer trees when set out quite young, or at not more than two years from the bud or graft, the following directions apply to such trees at the time of planting and immediately afterward. Three or four side-shoots on the unformed tree (Figs. 137 and 138) should be at first selected, to form the main branches and to constitute the foundation or framework of the future top (see Fig. 123). In order to secure a well-formed and nicely balanced head, these shoots must be frequently watched through the first summer of growth, and if any of them are disposed to take the lead of the others they should be pinched and checked to maintain an equality. Two buds will be enough to grow on each of these shoots, making eight at the end of the season, taking care that all are distributed at equal distances (Fig. 139). All the other shoots should be rubbed off with the thumb and finger as soon as they form. The second year the same process is repeated on the new shoots, and continued until a handsome, even, symmetrical framework for the future head is obtained, after which comparatively little attention will be necessary. A large orchard of young trees may be managed in this way with a very few days' labor—far less than that afterward required in cutting out large limbs and giving shape to the distorted tops of full-grown, neglected orchards. These rules will apply, substantially, to the pruning of standard pears, except that they generally require less thinning out.



FIG. 139.—Well-formed Head.

Nearly the same course is to be pursued in forming the heads of dwarf apple-trees, with the exception that the base of the head should be only about ten inches from the ground (Fig. 145); or, if they be half-standards on Doucin

stocks, the heads should be about twenty inches or two feet high.

Pyramids.—For pyramids (a form of training applied most frequently to dwarf pears), the early treatment is quite different from that of standards. As the sap tends to the summit of the tree, producing the strongest side-shoots toward the top, and the shortest and most feeble toward the bottom, the natural form of the tree gradually becomes a trunk or stem with a branching head. To prevent this result, and give a strong, broad set of branches at the bottom, a thorough and regular system of shortening-down must be adopted at the outset. The following is a brief outline of the course usually pursued:

After the single shoot from the bud has grown one season (Fig. 140), it is cut down so as to leave not over one foot, and



FIG. 140. FIG. 141. FIG. 142.

Starting the Pyramid.

if the tree is weak not over six inches (Fig. 141). As a consequence, the buds on this remaining portion, receiving all the sap, make a vigorous growth. The upper one must be converted into a leader, by pinching off early the tips of the others, beginning first with the upper ones, which will be the strongest, and gradually descending as the season advances to the lower ones, which should be left the longest in order to give them the most strength (Fig. 142). Six inches of naked stem below the branches should be left, by rubbing off all shoots below; and if in a region liable to deep snows, this space should be a foot, to prevent splitting off the limbs by the weight of the snow, and for which object the tree should not be cut down lower than eighteen inches at the close of the first season. The pruning after the second year's growth, consists in cutting down again the leader for a second crop of side-shoots; and these side-shoots, and the new leader, are to be treated precisely as those below were treated the year before. At the same time, the last year's side-shoots, on the lower part, are to be cut back (the longest at the bottom so as to give a pyramidal form), in order to insure the growth of the buds upon them. The new side-shoots thus caused may

be pinched off so as to convert them into fruit-spurs (according to the process described hereafter in this chapter), except one shoot left on each as a leader, and another, if needed, to fill up the space made by the widening limbs. The pyramid may now be said to have been fairly formed; and it is only requisite to continue and prolong the same process for successive years. Fig. 143 represents a four-year pyramid three times pruned, each section being shown at the figures 1, 2, 3,



FIG. 143.—Four-year Pyramid.



FIG. 144.—Bearing Dwarf Pear.

and the cross-lines indicating the place for the fourth pruning. Fig. 144 represents a perfectly pruned pyramid in bearing.

After the tree has attained sufficient size, its further extension is prevented by pruning back the shoots.

If the fruit-spurs become too numerous, a part of them are to be pruned out closely so as to give an even and not crowded crop. When spurs become too old, they may be mostly removed for new ones to spring from their bases.

Some varieties of the pear throw out side-shoots spontaneously the first year. Such trees may be treated in a manner not unlike the ordinary two-year pyramid. On the contrary,

such sorts as have small or flat buds may need a more severe cutting-back than others, in order to arouse the buds into action and induce them to break into shoots.

T. G. Yeomans, a successful cultivator of the dwarf pear for market, gives the following excellent practical directions for pruning the trees, suited to orchard management:—

“Experience has convinced me, that with good trees of well-chosen varieties, on any good corn-land which is never too wet; and with the culture a good farmer gives his other crops, and the important—nay more, the indispensable requisite to success—*thorough pruning*, no one need fail of attaining a degree of success highly satisfactory and profitable.

“A dwarf pear-tree should never be planted at one year old. A good one-year-old tree consists of a single upright shoot or stem, from three and one-half to five feet high, and should be cut off at about two feet from the ground; and in order to give a smooth, handsome stem or trunk, let the buds be rubbed off to the height of one foot from the ground—leaving on the upper portion six to nine buds, more or less; with the tree standing in its original position in full vigor, and cut back as above stated, each one of these buds will throw out a good strong branch, which gives a full round distaff-form to the tree; and this is the time and manner, and the only time, when that desirable shape can be given, on which the future form of symmetry and beauty so much depends; and to avoid a fork-topped tree, in which the two uppermost branches are about of equal vigor and height, let the second branch from the top be pinched off, when about nine inches or a foot long, which will check and weaken it, while the uppermost one becomes a strong central leader. Whereas, if the tree be transplanted at one year old, and cut back as above stated, the vital forces of the tree will be weakened half or three-fourths by transplanting, and, as the result, only two or three (more or less) of the buds on the trunk will grow so as to form branches, and they, perhaps, only at the top or all on one side, while the remaining buds remain dormant, never afterward to be developed, as the other branches form new channels, which will more readily carry the sap to the other and upper portions of the tree.

“For transplanting, therefore, let a tree be two years old

from the bud, well cut back at one year old, and with six to nine main branches, which form the framework or foundation, which is to give form and character to the future tree, with proper care and management.

"The following cut (Fig. 145) will illustrate a two-year-old tree, as above described, its lower branches about one foot from the ground, its upper branches being the strongest and most upright, and those below less vigorous and more horizontal.



FIG. 145.—Dwarf Pear, marked for trimming and transplanting.

"The dotted lines indicate where the branches should be cut back at the time of planting.

"In cutting a tree, with branches formed as above described, let the leader be cut down within four to six inches of the place where the one-year-old tree was cut off, and just above a good bud on the side of the tree, over the previous year's cut, thus keeping the leader in a perpendicular position over the original trunk or bottom of the tree.

"If the side-branches are too horizontal, upper buds are left for their extension; if too upright, lower buds are left.

Side direction may be given, if desirable, to fill wide spaces, in the same way. Cut the other branches at such a distance from the trunk, that the ends of all of them would form a pyramid, the base of which should not be over twelve to sixteen inches in diameter, and in smallish trees much less; thus the lowest branches will be left the longest; the object of which is to check the natural flow of sap to the upper branches and induce it to flow more forcibly to the lower ones, increasing the vigor and force of the latter as much as possible, which must be done at that time, or never.

"Fig. 146 represents a two-year-old tree after it has been pruned at two years old, and made the third year's growth. and showing where it should be cut back at that time. All subsequent pruning will become easy to any one who has attended to these directions thus far—observing the same

principles, thinning out or cutting back any secondary or other branches, as shall seem necessary to admit light and air, or give vigor or symmetry of form to the tree; but as the greatest force of sap will flow to the central and upright branches, they will need to be cut back most, retaining as near as may be the pyramidal form; ever bearing in mind this fact, that no one prunes too much; and, after having pruned well and gathered rich harvests of luscious pears, if you still



FIG. 146.—Two-Year-Old Tree marked for trimming.



FIG. 147.—Dwarf Apple.

wish to grow them *larger and better* than ever before, prune a little closer, and that result will certainly be attained; and the *vigor, beauty, and longevity* of your trees will be increased thereby."

Throughout the whole process of pruning and training pyramids, as well as every other tree, the frequent error of allowing the shoots and branches to become thick and crowd each other, should be carefully avoided. The size and beauty of the fruit, and its perfection in richness and flavor, where there is plenty of room for the full, vigorous, and healthy development of the LEAVES *which supply the material for the growing fruit*, will repay well the labor required for this excellent result.

Dwarf apples (on Paradise stocks) are usually trained to a round and rather spreading open head, the same principles to

be applied as in forming dwarf pears, with the exception of the form given to them, and being more dwarfish in growth, less shortening of the shoots is required (Fig. 147).

Small, slow-growing varieties, as the Melon, Early Joe, Red Canada, Hawley, Jonathan, Lady Sweet, Summer Pearmain, Dyer, Lady, and Lowell, may be pruned into pyramids and kept small, so as to stand not farther than ten feet apart. Thriftier varieties, on Doucin stock, may be treated in the same way.

The Cherry and Plum may be pruned in the form of pyramids on the same principles as the apple and pear. The Morrello and Duke cherries may be treated either as pyramids or as smaller, rounded, open-headed dwarfs.

Pruning Apple-Orchards in Bearing.—The mode of pruning old neglected apple-trees, with a view to restoring their vigor and fruitfulness, is more particularly pointed out on another page; it may be only necessary here to remark that the chief requisites to keep steadily in view during the operation, are: 1. To avoid cutting off large limbs except in cases of absolute necessity. 2. To admit light equally into all parts of the tree by thinning out the branches. 3. To remove all crooked or badly growing limbs, and reserve a handsome evenly distributed top. 4. To do the work gradually, or in successive years, and commencing by preference at the top or centre, which will favor an open top. 5. To give a coating on all fresh wounds an inch or more in diameter, of the composition made of shellac dissolved in alcohol, just thick enough to be of the consistence of paint. The surface should be allowed to remain uncovered a few days after the cut is made, in order to become dry. The handle of the brush being inserted in the cork, it is kept air-tight in drying, and always ready; but fine sand, brick dust, or powdered chalk, mixed with warm gas-tar, is a good application and much cheaper. Grafting-wax does well, and may be applied with a brush when melted, or in the form of thick



FIG. 148.—Limb properly cut at A; improperly at B.

plasters. Thick white lead paint is the best single material, however.

Pruning-saws are required for this work, which should always be kept sharp and in good condition; those made with coarse teeth on one edge, and slightly finer on the other, will



FIG. 149.—Two-edge Pruning Saw.

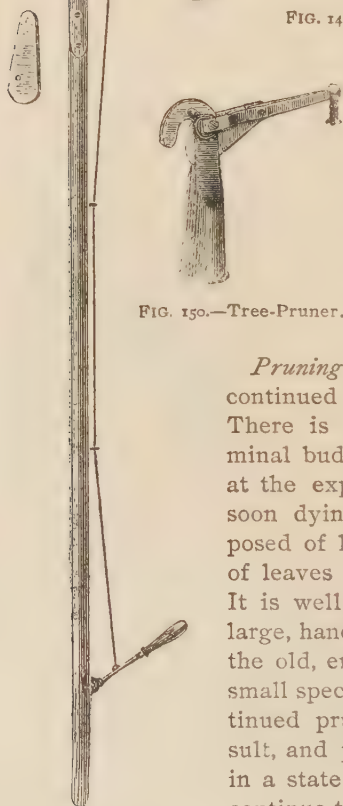


FIG. 150.—Tree-Pruner.

be found most handy (Fig. 149).

For trimming branches not over one inch in diameter on the more inaccessible parts of the trees, a powerful cutting-shears on the end of a pole has been devised, which is extremely useful (Figs. 150 and 151).

Pruning the Peach.—No tree requires continued pruning so much as the peach. There is a strong tendency in the terminal buds to push upward and outward, at the expense of the side-shoots, which soon dying, the tree ultimately is composed of long, bare poles with only tufts of leaves at their extremities (Fig. 152). It is well known that young trees bear large, handsome, and excellent fruit, while the old, enfeebled trees yield nothing but small specimens of inferior quality. Continued pruning will prevent this bad result, and preserve the heads of old trees in a state of thrifty growth, and they will continue to yield as large and fine fruit as in the first years of bearing. As the peach always bears its fruit on the previous years'

growth, and buds never start from old wood, it is important to keep a continued supply of young wood, evenly

FIG. 151.—Water's Tree-Pruner.

distributed throughout the head. This can only be done by continued cutting-back. The best way to perform this operation is to commence at the close of winter or early



FIG. 152.—Neglected Peach-tree.

in spring, and cut off the upper half or two-thirds of every one-year shoot. If this process is continued from year to year, in connection with cutting entirely out all the feeble



FIG. 153.—Correctly Trimmed Peach, best method and form.

shoots where they grow too thickly, the desired object will be fully attained and the trees, as they grow older, instead of presenting the appearance of Fig. 152, will form the sym-

metrical, evenly distributed heads shown in Fig. 153. An important advantage of thus pruning the peach will be the thinning-out of the fruit-buds; and while the tree will bear perhaps only one-third or one-quarter the number of specimens, they will be so much larger as to give as many bushels, while the quality will be incomparably superior.

An objection is made that too much labor is required for this operation. By the use of a good pair of pruning-shears, however, it may be done with great expedition, and half a dozen trees finished in the same time that would be required for a single tree in using the knife.

Another mode, more rapidly performed, and answering



FIG. 154.



FIG. 155.

Heading-back of the Peach.

nearly the same purpose, is to cut off two or three years' growth at a time, from all the longer branches, taking care to leave a sufficiency of young wood, and always cutting back to a fork, so as not to make a dead stub.

In cases where the pruning has been neglected on young trees, until they have attained several years of age, and the shoots have just begun to die out in the centre, a still more wholesale kind of pruning may be adopted. Three or four feet may be taken off, in cases of necessity, at a single stroke, and if judiciously performed, will convert the broad head which is beginning to become enfeebled, into a smaller, neat,

round, and open head, possessing the thriftiness of a young tree, and bearing as large and excellent fruit. Fig. 154 shows the tree before being thus cut back, and Fig. 155 the same, with all the ends of the branches (shown by dotted lines) removed. It must be remembered here, as in all other instances, that the outer shoots must be sufficiently *thinned back* to admit light to the interior. The shearing, which is sometimes adopted, like that of a common hedge, only thickens the foliage on the outside, and increases instead of diminishing the evil.

Pruning the Cherry.—The cherry usually needs but little pruning, after the young tree has been properly formed. As



FIG. 156.—Trimmed Quince.



FIG. 157.—Young Quince, from which a good tree may be formed.

wounds made in winter are apt to form gum, and the removal of much foliage in summer injures the tree by checking its growth, the rubbing and pinching process should be exclusively resorted to, in forming an even and well-distributed head, nearly in the same manner as already described for the apple. The only care, as the trees become older, is to see that no shoots, by outgrowing the others, form a distorted top.

Nearly the same rules apply to the plum; but as single shoots sometimes make a long growth in one season, an eye

must be kept to them, and the necessary rubbing and pinching performed, that they do not outgrow the others.

Pruning the Quince.—Young quince-trees, as sold by nurserymen in this country, have, in many instances, received no pruning or training, and resemble Fig. 156. To give them a single straight stem, and to impart sufficient vigor to form a good well-balanced head, such trees should be cut down near the ground as soon as they become well established, and a single upright shoot allowed to grow for the future tree (Fig. 157). The second year a good head may be commenced, according to the directions given for the dwarf apple.

Special directions for pruning the Grape, Raspberry, Blackberry, Gooseberry, and Currant will be found in the chapters devoted to these different fruits.

Trees which are kept in good shape while young will not require heavy pruning in after years. But orchards rarely receive this perfect management, and more or less pruning occasionally becomes necessary. The owner is often unable to attend in person to all the details, or to direct the laborer in the removal of each successive limb.

To obviate this difficulty, attach a cylinder of chalk to a rod several feet in length, in the manner represented in Fig. 158, and taking this rod in the hand, make a distinct white chalk-mark, at the precise spot where the pruning-saw is to cut through for the removal of the rejected branch. The workman follows with the saw, and cuts off every branch at the right place, with greater accuracy than verbal directions could point out, and without hesitation or delay. The owner may mark out enough work with the chalk in an hour to occupy the laborer through the



FIG. 158.—To mark the limbs to be cut.

day, and the whole operation be performed with skill and accuracy. If the trees are tall the marking may be done on horseback.

Pruning the Roots.—This has been tried to a limited extent only, and has proved useful in checking over-luxuriant growth attended with unfruitfulness. Its tendency, by lessening the supply of sap, is to render trees more dwarfish, and operates not unlike grafting on dwarf stocks; or in the same way, but in less degree, that transplanting produces a like result. It should usually be done early in spring, and with a spade ground sharp and kept solely for this purpose, so that the roots may be cut off smoothly, and not torn or bruised, as with a dull spade. Any required degree of check may be given to the tree by cutting the roots short or near the foot of the stem—a less check by allowing greater length.

To Recapitulate.—1. Begin to prune when the tree is young. 2. Prune a little every year. 3. Aim to keep the tree in such shape that very heavy pruning is unnecessary. 4. The general pruning is best done in very late winter. 5. Light heading-in in summer sometimes induces the formation of fruit-spurs. 6. Always prune back heavily on transplanting. 7. Each kind of species of tree needs its own kind of pruning.

CHAPTER VIII.

HAND IMPLEMENTS USED BY FRUIT GROWERS.

THE more common tools needed are the shovel, the spade, the fork, and the hoe, for digging holes, transplanting, and cultivating the ground. The fork and rake are useful in mixing manures with the soil for filling the remote parts of large holes.

The *pruning-knife* is a large, usually hooked knife, for removing useless branches. Common styles are shown in Fig 159. The middle one is mostly used.



FIG. 159.—Various Forms of Pruning-Knives.

The *pruning-saw* (Figs. 160 and 161) is needed in taking off larger limbs; attached to a handle several feet long, it will reach those at a distance from the ground.

The *draw-saw* (Fig. 162) has the direction of the teeth the

reverse of the common saw; that is, they should point toward the operator. Being thus only subject to a *pulling* strain, it



FIG. 160.



FIG. 161.—Pruning-Saws.

does not require so thick a blade as the *thrust-saw*, with the teeth in the usual way. For this reason it is less liable to

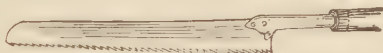


FIG. 162.—Draw-Saw.

become broken or twisted. The two-edged saw (Fig. 163) can be readily purchased anywhere and is very useful.

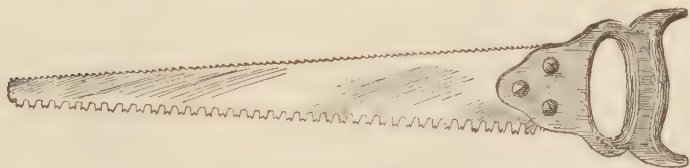


FIG. 163.—Two-edged Pruning-saw.

The *budding-knives* (Fig. 164) should have a broad, flat blade, the edge of which is to be rounded outward, for the more ready incision of the bark. The thin ivory blade or *haft* at the extremity of the handle, as provided on some budding-knives, may be dispensed with in nearly all cases, the bud, when set in, lifting the bark as it slides downward, more perfectly

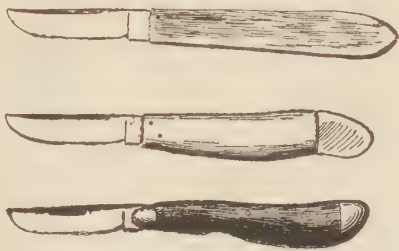


FIG. 164.—Budding-Knives.

than by any other mode, after the corners of the bark are lifted with the point of the blade.

The *grafting-chisel* (Fig. 165) is useful in cleft-grafting large apple-trees. It is made of iron, the edge set with steel. It



FIG. 165.—Grafting-Chisel. See also Fig. 28.

is used for splitting the stock, after it is sawed off and pared. The cutting part should be not less than two inches broad, with a sharp edge, which should curve inward, that the bark, in splitting, may be cut first, to give it a smooth, flat face. The

wedge at the end opens the stock to receive the graft.

The pruning shears shown in Figs. 166 and 167 are, taken all in all, the most useful tool the orchardist can have. There

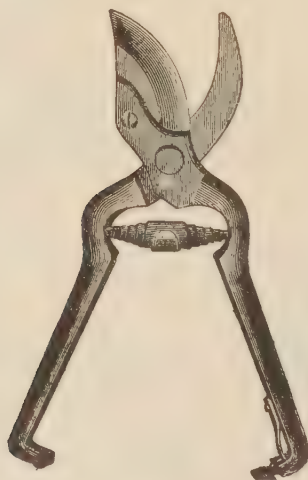


FIG. 166.



FIG. 167.

Forms of Pruning-Shears.

are a variety of patterns of these shears, differing mainly in the form of spring used to keep the blades apart.

In using the long-handled pruning-saw, the pruning-chisel,

the graft-cutter, or the fruit-gatherer, the operator may stand on a ladder or his stool, as an additional assistance in reaching the higher parts of the tree.

The *orchardist's hook* consists of a light rod, with an iron hook at one end, and a piece of wood made to slide along it. In using it the fruit-gatherer draws down the end of a branch with the hook, and fastens it by the sliding-piece to another branch below. The slider passes freely along the rod, but ceases to slide by the friction of the side-strain whenever it is in use, Fig. 168.



FIG. 168.—Orchardist's Hook.

Fruit on the ends of long and tall branches may be gathered by means of the fruit-picker shown in the annexed figures (Figs. 169 and 170). Fig. 169 consists of a piece of stiff wire about two feet long, bent into the form shown at *a*; the two ends are then thrust through gimlet-holes in the end of a pole; a small bag, large enough to hold half-a-dozen apples, is sewed to the wire. This completes the instrument. The narrow part of the wire assists in removing the stem from the branch. A picker of some sort

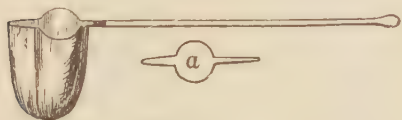


FIG. 169.

Fruit-Picker.

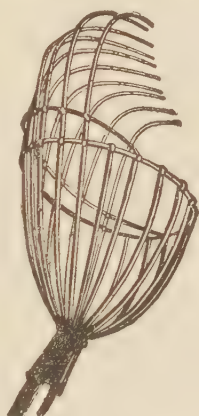


FIG. 170.

is especially valuable in gathering any valuable fruit, such as pears or peaches, which would otherwise be bruised and spoiled.

Vine Scissors.—Neat and convenient instruments for thinning out the berries from bunches of grapes which have grown too thick, for removing unnecessary shoots, leaves, etc., and for gathering the fruit, are shown in the annexed cuts (Figs. 171, 172, and 173). The uppermost one is commonly used.

Garden Reel.—Fig. 174 represents the reel for the garden-line and stake for stretching the same, all made of iron. The stakes should be at least a foot long. The line should be a

strong, well-twisted hemp cord, about one-fifth of an inch in

diameter, which, when not in use, is quickly wound up on the reel. It is employed for setting trees in rows.

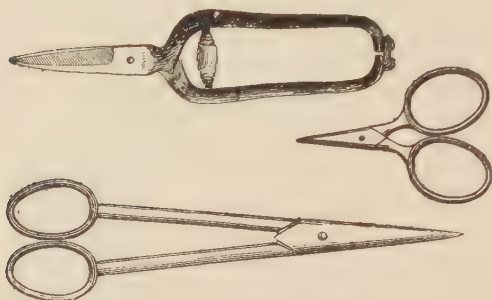


FIG. 171, 172, and 173.—Forms of Vine Scissors.

Self-sustaining fruit-ladders are very useful in gathering fine fruit, to prevent mutilation and

bruising of the bark and branches. Fig. 175 is one of small size and simple construction, is easily carried in one hand, and will raise one's feet a yard or more from the ground. It consists of a small piece of light plank at the top, supported

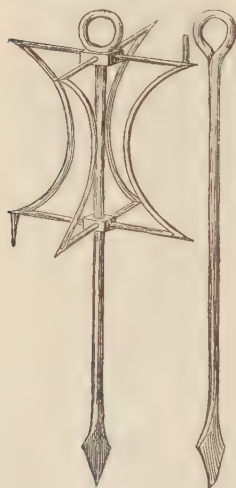


FIG. 175.



FIG. 176.



FIG. 174.—Garden Reel. Fruit-tree Ladders. FIG. 177.—Pointed Ladder.

on legs not larger than common chair-legs. Fig. 176 represents one from eight to twelve feet high, the two single legs moving on joints, for closing in carrying, and spreading like a tripod in setting up under the tree.

An improvement has been made by continuing the two main bars to a point, which more readily enables the operator to thrust it up among the branches, and often to support himself by grasping this elevated point. The legs turn at the hinges *b* (Fig. 177).

The *folding-ladder* may be closed together with the facility of a pair of compasses; it then becomes a round stick easily

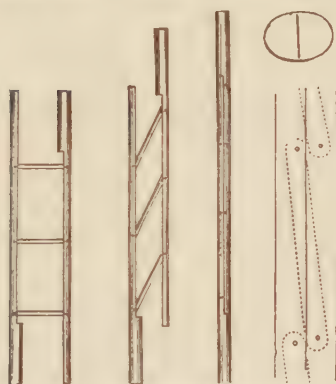


FIG. 178.—Folding Ladder.

carried in one hand. It is made of strong, light wood, and its construction may be readily understood by the annexed figure (Fig. 178), representing the ladder as open, as half-closed, and as closely shut. An enlarged longitudinal section shows the manner in which the rounds lie in the grooves or concave beds in the sides or styles; above which is a cross-section exhibiting the semi-oval form of the styles. The ends of the rounds turn on iron pins, slightly

riveted outside. The rounds resting on shoulders, when the ladder is opened, render the whole stiff and firm. A ladder of this construction is found very useful, not only in fruit-houses, where a common ladder could not be conveniently carried, but in pruning standard trees, because it can be thrust through the branches like a round pole, without difficulty, and when once there, it is easily opened.

Tree Scraper (Fig. 179).—This is used for removing the rough and shaggy bark, moss, etc., from old fruit-trees.

It consists of a triangular plate of steel, attached to a handle at the centre.

The sides of the triangle are about four inches, and the handle may be from one to several feet in length.



FIG. 179.—Tree-Scraper.

Garden Syringe (Figs. 180, 181).—This is made of various sizes, or different materials, and with different caps or orifices. The cheapest is made of thick sheet-tin, and the best and

most durable of brass. For throwing a single stream, the jet represented in the figure is attached; for washing dusty foliage with a soft shower, a rose with many fine holes is screwed

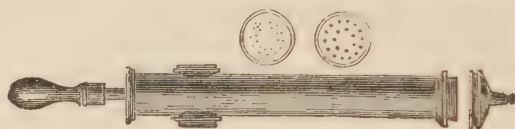


FIG. 180.



FIG. 181.—Garden Syringes.

on. The syringe is used for washing, watering, destroying insects, etc.

Garden Pump (Fig. 182).—This may be used for all the purposes of a syringe, in spraying and watering plants, as well as for washing windows, carriages, and protecting buildings against fire. It will hold about a barrel of water, and is easily moved by its handles on the cast-iron wheels. It will throw water forty feet high.

Net Screens are useful in preventing the attack of birds on rare and valuable fruits upon young or dwarf trees. The net should be dipped in a decoction of tan to prevent mildew when rolled up wet.



FIG. 182.—Garden Spray Pump.

Labels for standard trees are useful in retaining the names of the varieties. Purchasers of trees usually neglect the names, and the labels received with the trees being soon lost, nothing more is thought of them till they begin to bear. Curiosity is then excited to know the "new kinds." Conjec-

ture is set on foot, and the greatest confusion follows. Serious and innumerable mistakes are made and perpetuated in this way in all parts of the country.

Permanent labels are therefore important. The simplest is made of a slip of wood, three inches long and half an inch



FIG. 183.—Wooden Tag.

wide, suspended to the branch by a loop of wire; copper wire is the best (Fig. 183). The name will last three or four years, if written with a pencil on a thin coat of fresh white paint. Better and more durable labels are made of small pieces of sheet zinc, written upon with a mixture of two parts (by weight) of verdigris, two of sal-ammoniac, one of lampblack, and thirty of water. The ingredients are to be mixed

in a mortar with a small portion of water at first, and the whole added afterward. Preserve the mixture in a well-corked bottle, shaking it repeatedly at first, and keep the cork downward to prevent the escape of ammonia, and it will remain fit for use for years. Or just as good, use Payson's or other indelible ink, sold everywhere for marking linen. A common steel pen may be used. Wash the zinc first with vinegar to remove the oiliness which is generally on the metal.

The pieces of zinc may be suspended by strong wire. These labels or tallies should be made up in the winter season when work is slack. The wire should be firmly twisted round the zinc, so as not to remain loose (Fig. 184), or else the constant motion from wind will soon wear out the wire. The wire should be nearly as large as a small knitting-needle, to prevent cracking off by long use. The loop should be large, and pass round a side-shoot instead of a main branch, to prevent the danger of cutting-in by the growth of the tree; and should be attached below a small fork, to prevent its blowing off the end of the branch.



FIG. 184.—Zinc Tag.

The wire may be wholly dispensed with by the following contrivance: cut the zinc into long triangular strips, half an inch wide and from six to ten inches long. Draw the narrow

or slender end round the twig, bring it through a hole punched midway between the ends, and clinch or twist it with the fingers or a small pair of pincers (Fig. 185). These labels may be cut and punched by a tinman at a cheap rate.

A good, durable, and cheap label is made of sheet tin. Cut the tin in strips about six inches long, somewhat in the form of a wedge, about a fourth of an inch wide at one end and three-fourths at the other. Write the name



FIG. 185. —Zinc Tag.

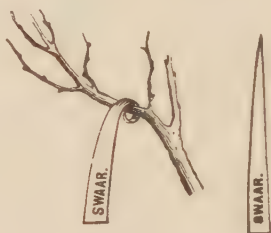


FIG. 186. —Zinc Tag.

near the wide end, with any sharp steel instrument, as an awl, or end of a file ground sharp, bearing on hard enough to go through the tin coating, so as to reach the iron. In a few months the rain, by penetrating to the iron, will rust it, and make the name quite conspicuous. The label is then attached to the tree by bending the narrow end once about a side-limb (Fig. 186). As the tree grows this coil will expand, and not cut the bark. On this account thin tin plate is better than thick. The coil should pass around but once, or it will not give way freely to the increase of growth.

Any tin-worker will cut them of scrap or refuse plate for about ten or fifteen cents per hundred.

Lead labels, in the form of those represented in Fig. 187, stamped with type, and suspended with copper wire, well twisted against the hole, to prevent wearing by the motion of the wind, are very durable. Fig. 187 shows the mode of stamping, by sliding the sheet-lead between two plates of iron, A, B, screwed together, and setting the types successively against the upper plate, A, and stamping one at a time. The

letters are thus kept in a straight line. The imprinted end of the sheet-lead is then cut off, and forms the label.

Composition lead labels with the names cast on them are much used in England, are very neat and durable but expensive. (Fig. 188). They may be imported from any of the leading seedsmen abroad.

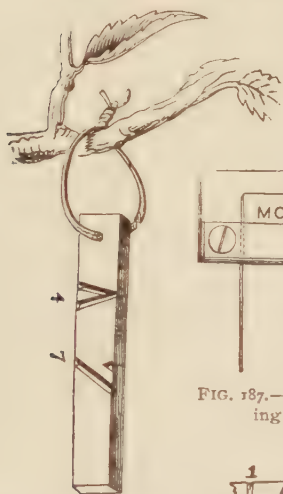


FIG. 189.—Notched Number Wooden Tag.

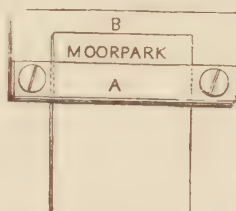


FIG. 187.—Device for Stamping Lead Tags.



FIG. 188.—English Cast Metal Tag.



FIG. 180.—Numbering by a Notched Stick.

Sticks or tallies at the ends of nursery rows, or labels suspended on the successive trees of a row of standards, may be durably numbered on red cedar, after the following manner, to correspond with a written register in a book. Fig. 189 shows the mode of notching with a knife, to indicate the ten figures. To prevent mistakes by getting them inverted, they are always read downward on a stake, or from the loop of a suspended label. Fig. 190 exhibits a label on a tree marked with the number 47.

No person who plants an orchard or fruit-garden should depend for distinguishing the names of his trees wholly on labels, which may be lost off. The rows, and the kinds in each row, should be registered in successive order, in a book kept for the purpose. This will facilitate the replacement of any lost label.

CHAPTER IX.

THINNING, GATHERING, KEEPING, AND MARKETING.

THINNING.

NEXT to good cultivation, nothing contributes more to bring out the excellent qualities of fruit, and to give it size and a handsome appearance, than thinning the young fruit on the tree. If crowded, it is small and often comparatively flavorless. Overbearing always injures the growth of the tree, yet thinning the fruit is scarcely ever practised. The farmer who takes care not to have more than four stalks of corn in a hill, and who would consider it folly to have twenty, never thins any of the twenty peaches on a small shoot. The gardener who would allow twenty cucumber vines in a hill, would be called an ignoramus by his neighbor, who at the same time suffers a dwarf pear to bear five times as many specimens as it could profitably mature.

All successful fruit-growers now expect to thin peaches, plums, apricots, and dwarf pears; and some of them thin standard pears and apples. Thinning may be accomplished by pruning, and by picking part of the fruit. Knowing where the fruit-spurs or fruit-buds are, the pruner can so reduce them as to lessen the amount of prospective fruit. Thus, the heading back of peaches and the removal of the inferior twigs in the middle of the tree, lessen the number of fruit-buds. On peaches and apricots, however, the operator must be careful not to reduce the buds too much by means of pruning, for he must allow of some loss from spring frosts, curculio, and other contingencies.

Thinning the fruit by picking it off is usually performed as soon as the "June drop" is passed. This "June drop" takes off the little fruits which chance not to be fertilized, and

those which are prematurely injured by insects or fungi. It is a good rule, in peach growing, not to allow any two peaches to stand within four inches of each other. The thinning is done when the fruit is the size of the end of one's thumb. It is better to burn the picked fruits, for one should exercise care to take off those fruits which are imperfect or diseased.

Apples and pears, when half grown, will show any defects or injuries from insects. In thinning the fruit these defective specimens should, in all cases, be removed. As many bushels of good fruit will be obtained from the trees in autumn as there would have been of good and bad mixed together, had all been left to grow. The labor of assorting will be lessened, and the fruit bring a higher price in market. An experienced orchardist says that one day's work to fifty barrels of apples will thus take out nearly all the imperfect fruit; while the increased labor of hand-picking so many poor specimens will be as great as taking them off in summer, when less care will be required with them.

GATHERING.

Mankind consists of two grand divisions—the careless and careful. Each individual may be assigned his place under these two great heads by observing how he picks or gathers fruit. The careless shake the crop down on the ground, or, if picked by hand, *throw* the specimens into the basket, rather than carry and deposit them carefully. Such persons wonder why they have such poor luck in keeping fruit—it nearly all rots prematurely.

The following is the right way: Gather by means of hooked baskets suspended in the tree; the apples, as gathered, should be laid one at a time in the bottom of the basket, and when filled the basket is taken down and the fruits are taken out two by two. To prevent the possibility of bruising, these should be drawn to the fruit-house on a spring wagon, and two apples only should be taken out at a time, till all are carefully deposited on the floor. After being barrelled, they can be stored till wanted or carried to the cars or steamboat, and carried, not rolled on board. If they are shipped to England, one barrel must be hoisted at a time and caught on a man's shoulder on the ship, and carried by two men and

deposited in place. When again unloaded the same care is observed, the barrels being carried off on a hand-barrow. Throughout the whole process the same care is observed as in carrying a looking-glass.

Various modes are adopted for hand-picking apples and other fruit. Ladders should always be provided for reaching the different parts of the tree. Step-ladders, five or six feet high, may be used for the lower limbs; longer ladders, resting against the branches, or supported by legs as shown in the chapter on Implements, are employed for higher portions. The remaining scattered fruit may be collected with a fruit-gatherer attached to the end of a pole. These are all figured and described in the chapter on Implements. Baskets are commonly employed furnished with hooks for suspending to the limbs or rounds of the ladder while filling. In picking, apples should be lifted up to break off the stem, instead of pulling them off, as many of the stems will pull out of the apples, causing decay. They should be laid in the basket (instead of being pitched or dropped in) to avoid bruising. A better way is to buckle a strap passing over the shoulder and beneath the arm, to which the basket may be hooked, leaving both hands free for work. These baskets should be round, so as to be small enough to allow turning for emptying while in the barrel, that the fruit may fall as short a distance as possible. Another mode is to wear a coat, made for the purpose, of strong canvas, furnished with large pockets on both sides, holding a peck or more each. The coat is slipped off and the pockets emptied into large baskets or barrels. A better and more expeditious method is to take a common clean grain-bag and place a stick, sharpened at each end and about a foot long, so as to prop the mouth open, leaving a triangular opening, ready for the reception of apples as fast as picked by both hands. Tie the upper and lower corner together, by placing a pebble in the lower corner, so as to form a knob or button, and then tie the bag-strings closely above it. It is then slung over the shoulder, as shown in Fig. 183. A piece of stiff leather buttoned on the shoulder serves to protect it from the weight of the bag. When the bag is filled it is placed in the bottom of the barrel or basket, and emptied by carefully withdrawing the bag and allowing the

apples to slide out without danger of bruising. In this respect it is more perfect than a basket, the contents of which must be dropped, unless handed out one by one.

The degree of maturity at which fruit should be picked varies with circumstances. Maturity is indicated in apples or pears by the dark-brown color of the seeds, but as these cannot be examined, external appearances must serve as a guide. Early apples are best when they have attained full color, and have begun to soften, except such as are liable to become dry or mealy, which should be picked some days before fully ripe. Winter apples should be mature but not ripe. All late winter varieties should be gathered when too hard to yield to the pressure of the thumb, and always before heavy autumn frosts. When a good keeper begins to drop from the tree, as sometimes happens, the crop should be gathered immediately. Windfalls should never be mixed with hand-picked fruit, as they have been bruised by falling, and often heated by the sun's rays so as to diminish their keeping qualities. They should be assorted and reserved for immediate use. Maturity in pears is indicated by a slight change in the color of the skin, and by the readiness with which the stem separates from the tree when the pear is lifted by the hand. There are, however, exceptions to this rule—the Bartlett, for instance, may be picked even before it has attained full size, and, in a week or two, will ripen into a fine, melting texture and excellent flavor. Ripening summer pears in the dark much improves their appearance. A Bartlett, for instance, fully exposed to the sun and allowed to ripen on the tree, or in a well-lighted apartment, will show perhaps only a light-brown cheek; but, if in a dark drawer, the light-brown will become a beautiful



FIG. 191.—How to Pick into a Bag.

carmine or crimson. When drawers are not at hand the maturing process may be accomplished on shelves, by first spreading a thick piece of woollen cloth, laying the pears on this, and covering them with the same.

Nearly all pears ripen with a much finer flavor if picked and afterward matured in the house. The exceptions are very few. Some, which prove only second or third rate when allowed to remain till they soften on the tree, become rich, melting, and delicious if house-ripened. Gathering the fruit while yet hard will, in nearly all cases, prevent or greatly diminish the *rotting at the core*, which otherwise nearly destroys the value of many early sorts.

Most varieties of winter pears should hang as long on the trees as safety from frost will permit, in order that their fine qualities may be fully perfected. Nothing contributes more to this high quality than keeping the trees in a state of strong, healthy growth, by good cultivation, in connection with thinning the fruit on the branches. There are a few sorts, as the Lawrence and Winter Nelis, which always, like the Seckel in autumn, possess a good flavor when even of small size; but most pears are greatly improved in quality, and all in fine appearance, when grown to a full size.

ASSORTING AND PACKING FOR MARKET.

Assorting, or separating the large from the small, the smooth from the defective, and the hard from the partly ripened, is a practice of great importance, though often neglected. Skilful marketers have learned that apples or pears of two sizes will both bring higher prices when separated, than when left mixed together. Indeed, a few small apples in a barrel have sometimes prevented the sale of the whole. This holds true of all kinds of fruit. For the same reason the most successful strawberry-growers are careful to assort the whole crop before placing the fruit in the boxes.

For long keeping, apples and pears should be carefully assorted, according to the degree of maturity which they show. Ripe ones soonest decay, and if mixed with hard ones soon spoil the whole. If separated, the frequent picking over is avoided.

The main part of the apple crop is moved in barrels. Some States regulate the size of apple barrels by law. Barrels are strong, are easily rolled or handled, and they are quoted in the staple markets. However, the bushel box, or other small package, is bound to come more and more into use, for it insures better packing, more careful grading, and more care to all the details. It also pleases the buyer. Common and cheap apples will continue to be sold in barrels, probably, but for the finer grades another package is desirable.

Apples are commonly piled under the trees after picking, and are then sorted into barrels. Some growers prefer to pack directly into the barrels, and this is no doubt preferable with the better and tenderer grades of fruit. Since most apples are sold to itinerant buyers, the desire of the buyer must be followed in respect to methods of packing. The better the market, the more careful must be the sorting and the packing. An apple which is underripe, overripe, wormy, scabby, misshapen, bruised, is not first-class, and should never be sent to a first-class personal customer. More fruit-growers fail in packing and marketing the fruit than in growing it.

Apples should be so snugly placed in the barrels that there can be no rattling when they are moved. They should therefore be slightly shaken several times while filling. A little practice will enable any one to do this sufficiently without danger of bruising. The upper stratum should be made as straight and uniform as practicable, and at such a height that the head of the barrel will slightly indent them--the dry wood absorbing the moisture and preventing decay.

A simple contrivance is adopted by packers for placing the head in position, and is shown in the annexed sketch (Fig. 192). It consists of a plank, *a*, on which the barrel stands, into one end of which is dovetailed an upright piece of plank, *b*, a little higher than the top of the barrel. A slot, *c*, is cut in its upper end, and a pin runs across to receive the end of the lever, *d*, which may be six or eight feet long. A round board is used as a follower, to be placed upon the head; and across this board is placed a cylindrical piece of wood about three inches in diameter (and flat on the lower side), on which the lever is placed. A moderate pressure at the end of the lever, and a little practice in its use, will enable the operator

to bring the head to its position with great ease, precision, and accuracy.

Fig. 193 shows another simple form of press, which requires an iron yoke made as shown, and Fig. 194, a still more perfect press.

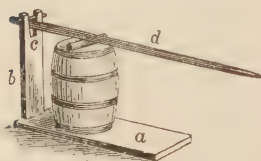


FIG. 192.—Simple Contrivance for heading-up Apple-Barrels.



FIG. 193.—Cheap Press for heading-up Apple-Barrels.

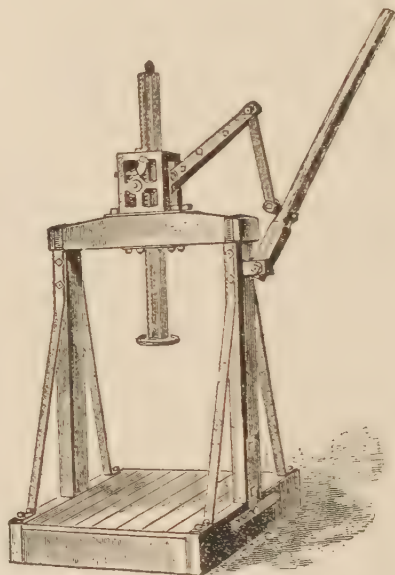


FIG. 194.—Press for heading-up Apple-Barrels.

Before filling, the barrel should have the hoops firmly driven on the bottom and nailed with shingle-nails, then drive on the bulge hoops and secure them with three or four barrel-nails in the outside ones. When filled, nail the head firmly. It is a good precaution to nail a small hoop outside each head and within the staves to prevent the bursting-out of the heads, which otherwise sometimes happens through careless handling.

Half-barrels have been found convenient for packing and keeping winter pears, and for sending them to market, packed as described for apples. Pear-growers who send their crops

to distant markets should pack them early enough to reach their destination before the softening process has commenced. Large losses have sometimes occurred from bruising and other injury when summer or autumn pears have been sent too late.

Apples and pears for shipping have sometimes been packed in charcoal dust, dry sand—and at other times separately wrapped in paper, in the same manner as oranges are shipped—but they can be shipped with as much success without any thing with them, if only managed with care in other respects.

In shipping fruit, none but the very best should be sent, all that are small, imperfect, or the least bruised, should be rejected.

Packing Grapes for Market.—None but well-grown and well-ripened bunches should be taken for this purpose. They should not be picked when wet, and all imperfect berries removed from the bunch. They should be allowed to dry twenty-four hours, which lessens their liability to be broken. Grapes are now generally sent to market placed in small wooden baskets containing five and ten pounds each and upward—a wooden cover fitting over the top and holding the fruit firmly in place. For immediate consumption some of the finest fruit is packed in wooden baskets without handles and sent to market in crates holding from four to eight baskets.

Such varieties of the grape as have a tough skin are least injured by long journeys; while those like the Worden, which are tender, cannot be sent to a distant market without many of the berries being broken open, although this liability is somewhat lessened by drying and slightly wilting for a day or two before packing.

The most successful grape-raisers, after they have selected the best sorts and the best soil, still give assiduous attention to three great points, viz: 1. Good and constant cultivation; 2. Careful pruning and thinning-out defective fruit; 3. Careful gathering and packing; 4. Attention to spraying. E. M. Bradley, of East Bloomfield, N. Y., a skilful marketer, has kindly furnished the author of this work the following statement of his management:

“Permit me first to say, that the market value of the grape

is more dependent upon judicious handling than that of any other fruit with which I am conversant. While the grape is a fruit peculiarly constituted to endure almost an unlimited amount of abuse in handling, no other fruit so richly pays every iota of care that may be expended upon it. The most casual observer of our great fruit-markets cannot but have noticed the wide range of prices in all kinds of fruit, produced by a difference in method and style of handling. And no fruit with which I am acquainted suffers more from neglect in growing and marketing, or more amply repays thorough husbandry.

"Thorough pulverization of the soil to a liberal depth *every week* during the *growing season* of the vine, a systematic thinning of fruit, and removing of all superfluous growth, will secure a well-matured crop of grapes. As soon as fully ripe (not before), the fruit should be carefully picked and laid in shallow, well-ventilated drawers, carried to the packing-house on a spring-wagon, and placed in racks or cribs over registers so constructed as to afford plenty of fresh air, but not exposed to light, or artificial heat. Here the fruit may remain for months in safety, and retain its plumpness and bloom perfectly. When desirable to send to market, the drawers are taken from the rack in the storeroom, and placed upon the tables in the packing-rooms, where the fruit is carefully assorted, all green berries and superfluous stems removed, and packed closely in paper pockets or wooden boxes, and immediately shipped. The packing-rooms should be well lighted. Small paper pockets, containing from one to three pounds, snugly packed in wooden cases, two dozen pockets in a case, are found to carry the fruit more safely to market than larger packages. The cases should be as nearly air-tight as possible. I have sent many tons, packed in this manner, to Charleston, S. C., Nashville, Tenn., Quincy, Bloomington, and Dubuque, on the Mississippi River, and many other towns, over equally hazardous routes, with entire safety. Good grapes, neatly packed in fancy paper pockets, will always sell at remunerative prices, however much the market may be '*glutted*' with fruit put up in a slovenly manner,

"In answer to your inquiries as to size and shape of

'pockets' most desirable, I would suggest as a rule, that the package be made to suit the desired market.

"Fancy-fruit retailers, who aim at high prices, require a fancy package, and in the early part of the season a one-pound package, gotten up in best style, will command as much money as a four or six pound package of equally good fruit, but less pretentious pockets; whilst the hotel or 'corner-grocery' men prefer them (for the table, or to be weighed out by the pound) in wooden cases, containing from twenty-five to thirty pounds each.

"My aim has ever been, in putting grapes into market, to meet the wants of the trade that I endeavored to supply. Boston, for example, will realize an enormous price for first-class fruit in fancy packages, whilst New York would pay far better in wood than in the costly pockets consumed by Boston every-day trade."

"The most popular package at the present time for grapes, peaches, and apricots is the Climax basket, which is made in various styles and sizes. These are made in sizes holding from five to ten or twelve pounds of fruit. They are handy, cheap, nest well in the shipment, and are durable. A good basket of any kind should be one which is neatly made, with no splinters or tag ends hanging from it, which is firm and symmetrical in shape, well nailed, and which is perfectly clean or white in appearance. Baskets become yellow and discolored, if they are left in the sun; therefore, when they are stored, they should be placed in a clean and dark dry loft or room. If packages which have been left over from the last year are somewhat dingy, it is sometimes possible to bleach them by burning a little sulphur in the room." (Bailey, "Principles of Fruit-Growing.") So general has the use of the Climax basket become for grapes that it is now commonly known as the "grape basket." In putting up a good quality of grapes, it is important that the "bloom" is not rubbed off, that the berries show no finger marks, and that the clusters be cut, not pulled, from the vine.

Packing Strawberries and Other Small Fruits.—These should be packed in small or shallow boxes, holding not over one quart—and sent to market in open-slat wooden crates. Both

baskets and crates, such as are now almost universally used everywhere, are undoubtedly familiar to every one

A convenient, light, and cheap set of drawers, or flat boxes, for conveying such firm-fleshed berries as currants, gooseberries, and the more solid strawberries, or for holding the smaller boxes, often used in portions of the West, is constructed in the following manner:

1. Prepare five drawers, each two feet long and twenty inches wide, and two inches deep in the clear. It is best to have them made of pine, three-eighths of an inch thick. It is most convenient to have the stuff all sawed the same width, say two and

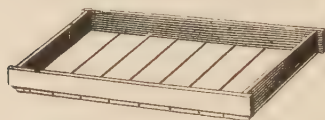


FIG. 195.

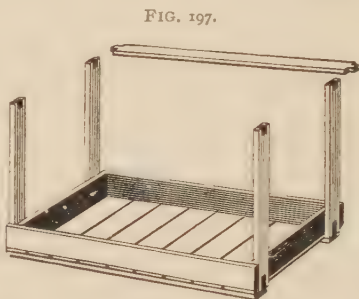


FIG. 197.

FIG. 196.

Wooden Nests for Small Fruit.

a half inches wide, and use it this width for the bottom, leaving them about one-sixteenth of an inch apart for ventilation. The front and back sides of each drawer should extend three-quarters of an inch beyond the ends, as shown in Fig. 195. Next, provide two strips of strong wood (white ash for example) two inches wide and three-quarters of an inch thick. These should be of the same length as the sides of the box, so that when placed lengthwise under the box they may project three-quarters of an inch beyond the ends. Nail these strips so that they shall be lengthwise under the bottom, and three-eighths of an inch from the outer part of the sides. The nails may be driven through the bottom down into the strips. Then nail to the box four similar strips placed vertically, so that their ends shall rest on these projecting pieces, as shown in Fig. 196, and strengthen the connection by sheet-iron straps passing around the corners.

When the boxes are used, the lower one, Fig. 196, is filled

with berries; then the next one, Fig. 195, is placed upon it, the projections exactly fitting the posts. This is next filled, and so on, successively, till the five drawers are all filled and in their places within the posts. Cut a board for a lid so as to fit accurately inside of these upright posts, which should be just long enough to project slightly above the lid. There should be open mortices or slots in the top of each post, so as to admit two top pieces, Fig. 197, made the same size as the bottom pieces already described, and with tenons cut on the ends to fit the slots. When these pieces are put in their places and fastened there by means of iron pins through them, or by means of hinged iron straps running over them and keying closely down, the lid will then be held securely to its place, and the whole set of drawers, with its contents, will be ready for railway conveyance.

It will be observed that the case, consisting almost entirely of drawers, is light. The arrangement of strips around the drawers, securely fastened at the corners, makes the case strong. Berries can be put into these drawers in bulk, or any of the boxes in use can be placed in them. They are cheap—a good carpenter can make four in a day, complete; the whole cost, made in the best manner, will not exceed \$1.50 or \$2.00 for a case **holding** two and a half or three bushels.

KEEPING FRUIT.

The essential requisites for the successful keeping of fruit are—1. A proper degree of maturity; 2. Careful hand-picking to avoid all bruises; 3. Assorting the ripe from the unripe; 4. An apartment with a low temperature and free from superabundant moisture; and 5. A pure air, free from unpleasant odors.

If a house-cellar is employed for this purpose, the fruit-room should be entirely separated from the rest by means of a wall for the purpose of excluding all odors, and for more perfectly controlling the temperature. On this account a cellar under a grain-barn commonly succeeds well, the floor above being double with a space of air between. A cellar that is too moist may be rendered dryer by paving with small

or broken stone, and covering this pavement with a coating of water-lime cement; and by building a single-brick wall within the common cellar walls, with an interposed space of air. Windows, hung on hinges on opposite sides, and rolling blinds, will assist in maintaining proper ventilation and temperature. A thermometer should be constantly kept in the apartment, which should be at all times near the freezing point if practicable. If the cellar cannot be kept cool enough in autumn, the fruit may be left till cold weather in open barrels, in a dry barn or shed opening to the north.

With a few exceptions, winter pears, if well matured, will keep and ripen in such an apartment without difficulty. There are a few sorts, however, which will require some days in a warmer room to finish the ripening process.

Apples may be kept headed in barrels resting on their sides if needed for spring use. If bedded in baked sawdust, or soft chaff (the chaff of timothy is best), moisture will be absorbed, the temperature kept cool and even, and few will decay. Those required for consumption through winter are kept best upon shelves. The shelves should be in the middle, and a passage extend all around, both for ready access and for ventilation. The shelves may be five feet wide, which will enable the attendant to reach the middle from either side without difficulty. There may be three shelves in an apartment nine feet high, with a space of two and a half feet between each, the lower one being within a foot of the floor. A board five inches high should extend around the edge of each shelf. For keeping pears, these shelves should be furnished with lids or covers to exclude the light; or flat movable boxes with covers may be placed on the shelves for the same purpose. A better and more compact contrivance for keeping pears is a series of drawers, occupying one or both sides of an apartment. Unless the fruit-cellar is a very dry one, these drawers should be in an unfreezing room above. The size of the fruit-cellar may vary with the amount to be kept. If the shelves are five feet wide, and a passage two and a half feet wide extend around them, a width of ten feet would be required for the whole apartment. The room may be of any desired length. A double series of shelves would require a width of seventeen and a half feet.

The accompanying figure (Fig. 198) represents the plan of a simple fruit-room, with shelves five feet wide in the centre, three in number, one above the other, supported by six posts, with a passage two and a half or three feet wide all around.

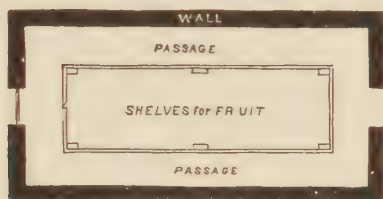


FIG. 198.—Plan of Fruit Room for Home Use.

Fig. 199 represents a larger fruit-room, with two series of shelves, and a row of drawers for pears on each side.

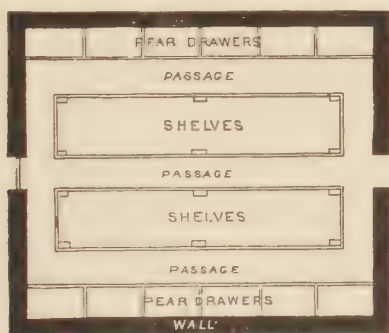


FIG. 199.—Plan for Larger Fruit Room.

Fruit-houses kept cold by ice are usually too expensive in construction and too costly in management for general use, and they are chiefly applicable to the perishable fruit ripening in summer and autumn. Winter fruit may be sufficiently preserved in cold storage or "cold-air" houses until the ripening of early strawberries and other small fruits, after which there is little demand for the supplies of the preceding year.

The *cold-air* houses are separate buildings above ground, built in the following manner: The walls are double, with a space filled with sawdust a foot thick, and they may be all

wood, or brick and stone, or have a triple-brick wall, the middle one with the brick on edge, and all bound together. The lower and upper floors are double, with the spaces filled with sawdust. The stone underpinning gives two feet air-space beneath the lower floor. The fruit-room is cooled by admitting the air from the outside through openings in the underpinning and through the lower floor, the warm air above passing out by a ventilator through the attic, which is surmounted with a cap which will insure an upward current of air when there is any wind or breeze. A single double-window affords sufficient light, and the fruit-room is entered through double doors set in an entry. As soon as the fruit-room is filled in autumn, it is cooled by the admission of cold night-air, and is kept within two or three degrees of freezing. To effect this cooling, the plank registers are opened in the ventilator above and in the lower floor, and air is admitted through the openings in the underpinning from without. When the thermometer shows the temperature of the room to be near freezing, the openings in the underpinning are shut with close-fitting wooden blocks, and the plank registers in the lower floor and in the ventilator are closed. By replenishing the cold air from without when required, the temperature is kept within two or three degrees of freezing through winter and spring as long as cool nights continue.

Large, two-story houses may be built for holding several thousand bushels, the second floor being made of slats to admit the air from below. The low temperature is more completely preserved by closing and packing the windows and doors as soon as the house is filled with fruit, and entering at the top, by means of outside stairs and a passage through the attic. These stairs are enclosed from the weather. A thermometer set in a niche in the lower end of a sliding-rod passing through the upper floor, enables the attendant to ascertain the temperature without entering and disturbing the air in the fruit-room below.

The air of the room may be partly cooled during the warm weather of summer by opening the ventilator and registers and admitting the earth-cooled air from the space beneath the lower floor. If large quantities of fruit are to be stored, the floors must be well strengthened with posts and piers. The

air in well-constructed houses on the cold-air principle has been kept for five months, through winter, within three degrees of freezing.

One of the most convenient modes for gathering, storing, and keeping apples for home consumption, is in flat boxes. These are filled directly



FIG. 200.—Piling Fruit Boxes.

from the trees in the orchard, and they may be at once conveyed to an out-building, or piled up in a sheltered place in the orchard in the way shown in Fig. 200. This mode admits the free circulation of air, and they may be protected from the weather with a board cover. As winter approaches, they are conveyed to the cellar or fruit-room without disturbing their contents. Or if they are to be received in a cold fruit-house, the fresh fruit may be at once conveyed to it.

When packed away for winter, the boxes may be disposed of as shown in Fig. 201, and when they are examined for the

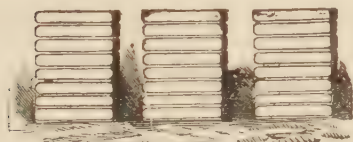


FIG. 201.—Storing Fruit Boxes.

removal of decaying specimens, the boxes are taken down one at a time, and replaced in a new pile. It will obviate the necessity of disturbing or turning over the fruit for examination, if the

boxes are quite shallow or only three or four inches deep, so as to contain only a single layer of specimens. They should have slatted bottoms, to admit the circulation of the cool air. If the lumber of which they are made is sawed of the right width, they are rapidly constructed by nailing together. A convenient size for the boxes is twenty by twenty-four inches, with slats at the bottom two inches wide and three-fourths of an inch apart. They will be cheaper for the same contents if six inches deep; but the fruit is more easily picked over when in a single layer with a depth of only three inches.

If the boxes are well made they will fit closely together in the piles, and, if desired, give nearly the same advantages of protection from currents of air and changes of temperature as when packed in barrels, while the fruit may be examined at

any time for the removal of decaying specimens, without being disturbed from the moment it is placed in the boxes in the orchard until taken out for use. This mode admits the storing of a large amount of fruit within a small space.

Keeping Grapes.—The great leading requisite for keeping grapes successfully in winter is to have them *well ripened*, but not over-ripe. When grown on crowded, unpruned, uncultivated vines, they will be small, acid, and watery, and will quickly shrivel in a dry atmosphere, and mould and decay in a moist one; and they will soon freeze if the temperature of the air goes much below the freezing point. But well-grown and well-ripened fruit (resulting from good cultivation and judicious pruning) contains a rich juice, which prevents them from shrivelling or decaying, and freezing, even at low temperature. Various modes are recommended for packing away grapes for winter. They all succeed well, if good, well-ripened fruit is taken, as already mentioned, and they are placed in a cool and rather dry apartment where they will not freeze. If packed in boxes, they are less liable to freeze than when exposed. These boxes should not be of pine, as it imparts a resinous flavor. They should, of course, be entirely free from moisture when packed away. As a general rule they are ripe enough when fit to eat. It was an old notion to leave them until the stems shrivel, but the practice now is to pick them when the stems are still green.

"Pick when fully ripe, and on a pleasant day. Let them stand in the grape-house for ten days or two weeks until all moisture is gone, and the stems are perfectly dry. Then pack in a small and shallow box about fourteen by ten and four inches deep, after cutting out all imperfect berries. Pack close and tight, and in the manner that the Hammondsport or Ohio grapes are sent to market, and nail up the boxes. Use no paper whatever. I have Isabellas to-day (March 7th) in fine order, packed this way. They must be kept in a cool and dry place."

H. G. Warner, of Rochester, who has kept grapes nearly into midsummer, lays down four essential requisites. They must be *ripe, clean, dry, and cold*. They are packed in boxes containing five, twelve, and twenty-four pounds. They are placed in a cellar under his barn, where the temperature is

often twenty-eight degrees through winter. Grapes will not freeze at this temperature when kept in boxes. He is careful not to place so many in each as to press upon or crush the lower ones. The boxes are nailed up and set one upon another, so as to occupy little room.

In conclusion, the following rules may be presented for strict observance in keeping fruit:

1. Let the temperature be kept as near the freezing point as practicable.
2. Keep the temperature as uniform as possible, as an occasional warm draught hastens decay.
3. Exclude air-currents of any kind not required to maintain a uniform degree of cold; hence drawers or covered boxes are better than open shelves.
4. Keep all odors away from the fruit, especially such odors as come from badly kept cellars.
5. See that only sound fruit is placed in storage. Unripe, overripe, diseased and wormy fruit should not be expected to keep well, no matter how perfect the conditions.
6. For storage of large lots for commercial purposes, it is usually better for the grower to put his fruit in the hands of parties who make a business of cold storage.

CHAPTER X.

FRUITS TO SUPPLY A FAMILY.

THE question is often asked, "What shall I plant in order to obtain a full supply of fresh fruit for a family the year round?" It is difficult to give a precise list, as in some seasons the crop may be many times greater than in others; and again, some will bear abundantly and others fail in the same season. The following, however, will serve as an approximation:

The earliest fruits, about the first of summer, will be strawberries. A selection of the most productive sorts, well cultivated, with the runners kept cut off, will afford several quarts a day from each square rod for a month. Three or four square rods will, therefore, give an abundant supply for a family. Four or five hundred plants will be sufficient for this extent of ground. These will be followed by the earliest cherries, and by currants, raspberries, and gooseberries. Fifty bushes of each of the two best sorts of currants, one hundred each of two varieties of raspberries, and twenty-five bushes of Industry or other good gooseberry, will, if well cultivated, furnish an abundant supply. There are some other gooseberries now as good or better. One dozen cherry-trees will be enough. One hundred bushes of the blackberry will supply several quarts a day for some weeks toward the close of summer. Apricots, early apples, and early pears, and a few of the earliest plums, will commence the season of abundance which, with the later varieties of these fruits, will last till near winter. Winter apples and pears, and all the good-keeping varieties of the grape, will continue the supply until spring. Long-keeping apples, such as the Northern Spy, Roxbury Russet, and other sorts, if placed in a good, cool fruit-room or cellar, will continue often until the commencement of the new supply of strawberries.

To obtain this supply there may be five or six apricot-trees, ten or twenty of plums, ten or fifteen of summer and autumn

pears, and as many more of winter varieties, the same number of summer and autumn apples, and from twenty-five to fifty trees of winter apples. Forty or fifty peach-trees and the same number of well-managed grape-vines will contribute materially to the variety and excellence of the supply. One hundred grape-vines in a well-cultivated vineyard will be sufficient to furnish all the fresh grapes wanted by a large family through the autumn and early winter months.

The extent of ground required will be about ten or twelve square rods for the different summer fruits, and an acre and a half or two acres more for all the others except the winter apples.

PLAN OF A FRUIT GARDEN.

The accompanying plan (Fig. 202) of an *acre fruit garden* shows the number and disposition of the trees of each kind. it is represented as a *square*, but may be varied in form to an oblong shape, planting about the same number of trees in fewer or more rows, as the case may be. It is so arranged that although the trees are of different sizes and at different distances, the rows run both ways, and admit readily of horse-cultivation. The plums are placed in a row at one side, in order that pigs and poultry may be confined exclusively among them during the season of the curculio, which proves one of the most efficient means for its destruction; and in connection with knocking on sheets, will afford good crops under any circumstances, if fully and efficiently applied. A movable or hurdle-fence, separating the plums from the rest of the trees, renders the remedy many times more efficient than if these animals were allowed the whole range of the fruit garden. In some places, where the curculio is particularly destructive, cherries and early apples are also attacked; in which case, as these fruits are next to the plum row, all may be included in the pig-yard, if desired.

Autumn and winter apples are not required in an enclosure of this kind, and the early sorts are placed here only to protect them from being stolen, besides the reason last named.

Pears may be planted with standards and dwarf together in the same row, the dwarfs bearing and flourishing while the others are coming forward; or they may be placed in separate

rows. The peaches, if in rows twenty feet apart, and twelve and a half feet in the row, will have quite enough room at any age, provided the long limbs are *thinned-in* from the outside every two or three years. With this care, apples may be planted much nearer than usual. None of the trees stand on exact squares; the importance of preserving straight rows for cultivation being greater than the form of the space occupied by each tree. When rows are wide apart, less room is needed between the trees in the rows.

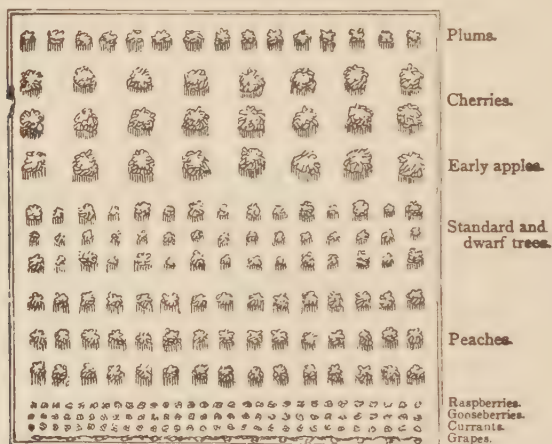


FIG. 202.—Plan of Fruit Garden.

By the arrangement we have here planned, the following trees may be planted on an acre, namely:

15 plum-trees, .	1	row, occupying 20 ft.—13 ft. in the row.			
16 cherry-trees, .	2	" "	40 "	26 "	"
8 early apples, .	1	" "	25 "	26 "	"
16 standard pears, }	3	" "	40 "	26 "	"
29 dwarf do. }				13 "	"
48 peach-trees, .	3	" "	60 "	13 "	"
45 raspberry, .	1	" "	4 "	4 "	"
45 gooseberry, .	1	" "	4 "	4 "	"
45 currant, .	1	" "	4 "	4 "	"
10 native grapes, .	1	" "	12 "	20 "	"

In all 132 trees, besides, the raspberries, currants, gooseberries, and grapes.

As every cultivator would make a different selection, and different sections of the country will make this necessary, see page 142 for directions upon this point. It is hardly necessary to occupy space here on this subject, except to remark that varieties *ripening in succession* should be sought, when a family supply is the object.

It may occur to some as an objection, that too much space is given to cherry-trees. There will be, however, a decided advantage from the abundance of light and air for the trees, in diminishing the tendency to *rot* in the fruit, one of the most serious drawbacks in cherry culture. More room is given to dwarf pears than usual, on account of their proximity to the standards.

All kinds of trees may be made to conform in some degree to the room allotted to them, by thinning in the exterior occasionally.

It may be stated that each side of a square acre is about 209 feet, and that the preceding measurements of distances will all come out in accordance with the plan.

There are many who would like a larger fruit garden. The following numbers and distances are accordingly given, the mode of arrangement being the same as in the preceding plan—each side of the two-acre lot being 295 feet.

40 plums, nectarines, and apricots,	}	2 rows, occupying 40 ft.—15 ft. in row.				
40 cherries, . . .		2	"	"	50	15
10 early apples .	1	"	"	30	30	"
40 standard pears,	2	"	"	40	15	"
80 dwarf do. .	2	"	"	20	7½	"
80 peaches, .	4	"	"	80	15	"
11 raspberries,	}	3	"	12	4	"
50 currants,						
25 gooseberries,						
10 native grapes, .	1	"	"	10	20	"

Strawberry-bed, 13 feet wide, 295 feet long.

The grapes are near the wall or fence, and, having the strawberry-bed and small bushes in front, are not shaded.

A fruit garden in this size furnishes 290 trees, ten grape-

vines on a trellis, and 216 raspberry, currant, and gooseberry bushes, with ample space for a strawberry-bed, a portion of which should be prepared each year for planting anew, say four feet wide, which will leave eight feet for bearing-beds, and give new plantations every third year.

HOW TO OBTAIN FRUIT QUICKLY ON NEW PLACES.

This is an inquiry that often occurs in the minds of many owners of new places, or who have built new houses on unimproved spots. We can inform such residents that much may be done toward an immediate supply with proper selection and management, and that the assertion which they often hear, that "it will take a lifetime to get fruit" from a new plantation, is an absurd error.

The quickest return is from planting *Strawberries*. If set out early in spring, they will bear a moderate crop the same season. We have repeatedly obtained a few ripe berries seven weeks from the day they were set out. The second year, if the bed is kept clean, the product will be abundant. Good varieties will safely yield any year a bushel from a square rod, or about two quarts a day for half a month.

Gooseberries, *Currants*, *Raspberries*, and *Blackberries* all bear at about the same period from the time of setting out. Good-sized gooseberry plants, say a foot and a half high, will give a good crop for bushes of their size the second year. We have had a bushel of Cherry currants the third summer after setting out quite small plants, from a row thirty feet long. A bush of Brinckle's Orange raspberry has been known repeatedly to bear about a hundred berries the same year that it was transplanted—the fruit, however, was not full size.

Dwarf Pears of the right sorts, and under right management, come quickly into bearing. The most prolific sorts give some returns the second year, and more afterward. Among the dwarf pears which bear soon are Louise Bonne of Jersey, Doyenne d'Été, White Doyenne, Giffard, Angoulême, Clairgeau, Josephine de Malines, etc. The following sorts bear nearly as early on pear stock, viz.; Bartlett, Seckel, Winter Nelis, Washington, Onondaga, Howell, Passe Colmer, Julienne.

Grapes afford fruit soon—usually beginning to bear the second and third year. The Concord, the Niagara, and Delaware are particularly recommended.

Dwarf Apples should not be entirely overlooked in the list of early bearers. Half a peck per tree is often obtained the third year from the most productive sorts.

Standard apples vary greatly in the matter of the age at which the trees bear fruit,—some producing a few at as early as four or five years, while others rarely do so until ten or twelve years old. For a record of a number of sorts see page 295.

A good supply of all the preceding will be sufficient to furnish a family with these wholesome luxuries from within a



FIG. 203.—The Circle of Fruits.

year or two of occupying entirely new premises; and will not only add greatly to the comforts and attractions of home, but contribute materially to the uniform health of the occupants.

The accompanying *Circle of Fruits*, Fig. 203, shows at once to the eye what kinds make up the yearly supply through the several months, varying of course with a difference in lati-

tude, and, through winter and spring, with the skill employed in preserving from decay.

As some varieties of all kinds of fruit do better in one section of the country than in others, it is important that intending growers should select the proper sorts for their locality. This book aims to describe all of the fruits grown in the United States, of any value, and while in very many cases the places where they are sure to do well is given, it is manifestly impossible to treat this matter satisfactorily. In all cases, therefore, it is advised that parties apply to the Agricultural Experiment Station of their State, for information and advice. Such applications are always courteously received and promptly answered. A full list of these stations will be found in chapter xv. Successful fruit-growers and reliable nurserymen, living in the given region, should also be consulted. After one has received and pondered all advice, his individual tastes must make the final decision as to varieties.

CHAPTER XI.

MANAGEMENT OF NURSERIES.

It is impossible in a work like this to give full directions for the raising and management of young trees in the nursery. Every one who buys trees should know when they have been properly cultivated; and as some planters prefer to raise their own trees, a few leading directions will be laid down for the guidance and assistance of such as wish to become more fully acquainted with nursery management.

Soils.—The first great requisite is the selection of a suitable soil. More depends upon such selection than at first glance would seem possible. At least ten thousand good trees may be raised on an acre—worth, at twenty cents each, two thousand dollars. If the soil is perfect in every respect, and the other requisites of good stocks, transplanting, and cultivation, are attended to, there will be no difficulty in raising this number. But if the soil be wet or sterile, or otherwise unsuited to the purpose, none of the trees can be good; one-half or nine-tenths may be stunted, crooked, and unsalable; the rest will perhaps not sell at half-price. While, therefore, a poor soil should not be accepted on any terms, it would be better to pay a hundred dollars yearly rent, if necessary, to secure one in perfect condition. A light or sandy soil will raise peach and cherry trees and often apples, and it may be worked with great ease and in all kinds of weather; but for standard pears and plums a stronger or more clayey soil is absolutely essential, and if properly underdrained, is often as good for all other trees. Every complete nursery, therefore, should either consist wholly, or in part, of a strong loam or loamy clay, which in general will require previous thorough tile draining. The necessary fertility given to such a soil will be retained several times longer than by light gravel or sand.

Nothing is commonly better than old pasture for the com-

mencement of a nursery. It should be ploughed twice or more until made perfectly mellow, which should be done the previous autumn if for planting in the spring. Or if turned over in the spring with the largest double plough to a depth of a foot or more, by means of three yoke of oxen, it will generally be found in a fine condition.

If the soil is not rich enough without manuring, it is better to apply the manure a year or two beforehand to other crops, or else to apply old rotted or composted manure. An application of wood-ashes at the rate of forty or fifty bushels per acre, if fresh, or a hundred or two, if leached, is often useful and sometimes eminently so. These ashes are well applied if mixed with the compost at the rate of one-tenth or one-twentieth of its bulk.

Laying Out.—Nurseries should be laid out so as to admit of horse cultivation. For this purpose strips of land twelve feet wide should be left on opposite sides of the nursery, at the ends of the rows, for the horse to turn about upon. Cross alleys should be left at convenient distances for carting out the trees and for the registry of the different kinds in the rows. The length of the rows between these alleys will depend somewhat upon the size of the nursery, varying from one hundred to three hundred feet.

Shelter.—In selecting a site for a nursery, the sweep of prevailing winds should be avoided; as in very windy places the young shoots from buds and grafts are apt to be blown or broken off, and the young trees bent or inclined. If necessary, belts or screens of evergreens may afford shelter from strong winds, not being placed, however, near enough to shade the trees, nor to injure their growth by the extension of their roots. On the other hand, low and sheltered valleys, being more liable to sharp night-frosts, are objectionable for the site of a nursery.

Fences and other barriers which cause large snow-drifts and a consequent breaking down of the young trees, should be avoided as much as practicable.

Seeds and Stocks.—The successful growth of the young nursery-trees depends essentially on good, vigorous, and healthy stocks. Seeds from healthy and vigorous trees, should, therefore, be always selected. It is common, in rais-

ing apple-seedlings, to procure pomace from cider-mills; wash out the seeds and plant promiscuously. If the strongest seedlings only, thus obtained, are selected for setting out good trees would be the result; but it would be better to obtain apples for this purpose from trees of known hardiness and fine growth. The same remarks will apply to the selection of pear-seed and cherry, plum, and peach stones.

Different modes are adopted for obtaining apple-seeds easily from the pomace. The following is similar to that used by most nursery-men. Make a box five feet wide, eight or nine feet long, and ten inches deep (Fig. 204); leave the lower end, *f*, one inch lower than the sides, for the water to

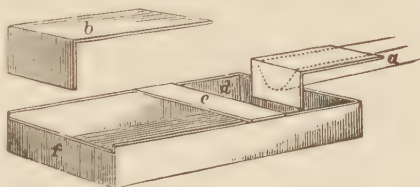


FIG. 204.—Apple-seed Washer.

flow over. Place this box in the bed of a brook or stream, on cross-bars or scantling, with a dam above to collect the water into a trough carrying the water into the box, and projecting six inches over it. This trough would be made of boards twelve inches wide nailed together, and the stream should be large enough to nearly fill it when flowing gently. To prevent the water from dashing into the box too furiously, two boards are first nailed together as shown at *b*, one board being eighteen inches by two feet, and the other eighteen inches by one foot. The longer board is placed on the top of the spout, and the shorter at right angles across the lower end of the spout. This serves to throw the water perpendicularly downward into the box, and at the same time to spread it out into a thin sheet. By moving this board up or down the spout, the quantity of water pouring into the box may be easily controlled.

One man stands on the board *c*, which extends across the box; and the other carries and deposits the pomace (well pounded to pieces) into the box at *d*, one or two bushels at a time. The man on the box then stirs the pomace rapidly with a four-tined fork, and throws out the straws. The pomace floats over the lower end (which is an inch lower than the sides), and the seeds fall to the bottom. A few back-strokes

from the lower end of the box assist in the separation of the remaining pomace. In washing a "cheese" that contains a bushel of seed, it is usual to wash it two or three times, by using a scoop-shovel. Afterward, the last cleaning process is given to it by placing the whole in a box, and then scratching a four-tined fork through it a few times. A little experience will enable any one to judge accurately of the proper quantity of water to turn on, so as to make rapid work and not carry the seed over the box.

The pomace, *fresh* from the cheese, should be drawn and placed on a board platform beside the box, and then plenty of water thrown upon it, until it is thoroughly soaked. This will render it easily beaten to pieces with a hoe. The pomace should never remain in the cheese over twenty-four hours, as it soon ferments and the seed is spoiled.

The best stocks for raising standard cherries suited to the eastern portions of the Middle States are procured from the Black Mazzard, which is the original type of the heart varieties. The fruit is to be collected when fully ripe by shaking or beating off on sheets placed below—the pulp washed off and the stones mixed with alternating layers of sand, and kept exposed to freezing and thawing until early the following spring. They are then to be planted out in nursery beds or thick rows. The spring following they may be transplanted to the permanent rows of the nursery. If the stones, after being washed from the pulp, are to be carried to a distance, they should be dried in the shade for a few days to prevent moulding. But the drying process should not be continued, as a few weeks' exposure to air will lessen or destroy their power of vegetating. Plum and peach stones may be similarly treated; but peach-stones do not as soon become injured by exposure to air as those of the smaller fruits. Plum and cherry stones keep well through winter, after being mixed with sand, by placing them in shallow pits only a few inches deep, and covering them with flat stones. They start very early in spring, and should be planted the moment the frost is out of the ground.

For dwarf cherries the seeds of the Mahaleb are used, and are treated precisely as those of the Black Mazzard already described. In the Western States the Mahaleb succeeds bet-

ter as a stock than the Mazzard; and the Morello stock, which is still hardier, answers the purpose well where the others fail, although the heart varieties, when budded into it, do not take readily unless these stocks are in the most thrifty condition.

Dwarf apple-trees are obtained by budding the common varieties on the Paradise or Doucin stock. The small Paradise apple, which grows but little larger than a currant-bush, reduces the size of the apple-tree worked upon it so as not to grow more than six or eight feet high, and to bear in two or three years. The Doucin stock is larger, and forms an apple-tree intermediate between the dwarf and the common standard. Both of these stocks are raised by layers or stools, and are commonly imported from Europe by nurserymen.

The French quince, which is employed as a stock for working such varieties of the pear as succeed well upon it to form dwarfs, is obtained by stools, layers, and cuttings. When cuttings are wanted they should be made in autumn, about ten inches or a foot long, and either planted out the same autumn or very early the following spring. They should be set in a compact soil, the earth closely pressed about them—the tips projecting an inch or two above the surface. They often fail in some kinds of soils. If set out either in autumn or spring they should be covered with an inch or two of fine fresh manure. This protects them from the cold through winter, and preserves the moisture of the ground in hot weather. Many of them will take root and grow, and should be taken up in the following autumn, and heeled in and covered, ready for setting out in the nursery rows in spring.

Planting Seeds.—Seeds are usually planted in thick seed-beds for the first year—especially those of the apple, pear, plum, and cherry. The ground should be rich, mellow, and in perfect condition. As a general rule, the depth should be from three to five times the length of the seed—heavy soils requiring less depth than light ones. If there is much clay the surface should receive a sprinkling about half an inch thick of fine manure to prevent the formation of a crust. The seedlings should not be so thick as to retard each other's growth. The ground should be kept constantly mellowed

throughout the summer to promote as free a growth as possible.

The seedlings should be taken up in autumn, and either heeled in or packed in boxes with fine compact moss. Before setting out they should be carefully assorted, so that a uniform size may be in each row and no irregularities or gaps occur. Before setting out, the tap-roots should be shortened and the tops reduced. All imperfect or doubtful plants should be rejected, in order to save the useless labor of transplanting those which will not grow or take the bud.

Seedlings which have a single slender root, as the apple may be transplanted expeditiously with a dibble, which may be easily made of an old spade-handle shod with sharp iron as in the annexed cut (Fig. 205). Other forms of this handy tool may be purchased as Fig. 206. Or, they may be set in a furrow.



FIG. 205.
Dibble.

The soil being previously deep and mellow, this instrument is thrust down by the side of the stretched line, finishing the whole by a few slight lateral motions of the hand, then thrusting in the seedling held in the left hand and pressing the earth very compactly about it with the same tool. Great care is to be taken that the hole be entirely and closely filled, and that no cavities are left among the roots below.

If the weather be dry, it will be well to immerse the roots previously in mud; and in any case but few plants should be left exposed to the air at a time.

If the seedlings be valuable, as those of the pear, or have broad branching roots like the French quince, they should be set out with a spade—a trench being previously cut by the line for this purpose, or a straight furrow made by a skilful ploughman before the line is stretched. One man holds each successive seedling with the hand, placing it close to the line, while the other covers the roots with a spade, moving backward in the row.

Seedlings may be set out in the nursery row in autumn if



FIG. 206.—Dibble.

perfectly hardy and the soil is not subject to heaving by frost; but, as a general rule, it is safer to do all the transplanting in spring. Pear stocks should be set out very early in the spring, to prevent check in their growth, and to admit of budding the same season.

The age for setting out seedlings must depend on circumstances. Yearlings, if strong and vigorous, are always the best, and it is extremely desirable that they grow with sufficient vigor to be budded the same season. If the budding has to be deferred, a whole year of time, cultivation, and care is lost—more than enough to overbalance the additional cost of the best stocks.

Cultivation.—The soil in the nursery should be kept perfectly clear of weeds and in a state of constant cultivation—especially during the early growth of the seedlings and young trees. Hand-hoeing is expensive, and is only needed for the extirpation of weeds, and occasionally, when performed with a pronged hoe, for loosening the clayey soil between the trees. The horse should be kept constantly going, either with the plough or cultivator. Careful hands should be employed for this purpose, who can run closely to the rows without injuring the trees. Short whiffletrees should be used with the strap-traces passing the ends as figured in a previous chapter. If the plough is used it should run shallow when near the rows. It is a useful implement for turning the soil away from trees before hoeing out weeds; and it may be also used for throwing a slight covering of mellow soil against them to cover up weeds as they are just appearing at the surface.

Budding and Grafting.—Root-grafting is extensively practised in the West for the apple. The mode of its performance is described in Chapter III. In setting out the root-grafts great care should be taken to pack the earth closely around them. Leaving cavities below, which is not unfrequently done by careless workmen, is sure to result in their failure. Root-grafting the pear only succeeds when strong seedlings, with well-branched roots, are taken, and the whole plant is used, inserting the graft at the collar and wrapping with muslin plasters. In the East, apples are budded.

Nearly all other stocks are budded. The time for budding varies much with the kind of tree, and with its condition. To

prove successful, it must be done when the bark of the stock lifts freely from the wood, and also when the inserted buds have been sufficiently matured. The cherry, in general, requires budding on the Mazzard stock, about midsummer; but sometimes the growth of the stock continues so late that it may be done near the close. The Mahaleb continues to grow later, and the budding may be correspondingly deferred. On the common stock the plum requires early budding; the wild or Canada plum, used for dwarfing, continues to grow much later. The operation may be performed on the apple at any time between the maturity of the inserted buds and the decrease in the growth of the stocks. The same remark will apply to the pear on pear stocks; as the latter is frequently struck with leaf-blight, which at once checks growth, it is safest to bud the standard pear only. The peach and the quince are worked from the middle to the close of summer and the beginning of autumn. As the removal of leaves from a tree in full growth always checks it, the stocks should have the side-shoots cut away to facilitate the operation of budding when necessary, some weeks before it is done, that they may recover entirely from its effects and be in a vigorous condition for the lifting of the bark. If this has not been seasonably attended to, it may be performed without detriment the same day the buds are inserted, cutting away as little as may be convenient.

It is hardly necessary to remind the operator of the importance of securing good, well-ripened, strong buds; of keeping the shoots well shaded and fresh during the day; and of carefully registering every variety, both by tally stakes at the ends of the rows and in a book kept for the purpose.

The best and handsomest trees are made when the buds are inserted within two or three inches of the ground. Dwarf pears should be budded at the surface. Crooked growers are sometimes worked on straight stocks three or four feet high.

Where buds fail they should be rebudded if the stocks will admit; but if not, they may be worked the following year, although this rarely pays.

In heading-down budded stocks in spring it is important that it be done quite early or before the buds swell, especially for the pear, plum, and cherry, which are severely checked in

growth by the loss of growing buds or foliage. For the same reason all other sprouts, except from the inserted bud, should be kept constantly and closely rubbed off.

About midsummer or a little later the projecting stubs (already mentioned in Chapter III.) should be carefully pared down to the growing shoot. The sooner this work is done the better, that the cut surface may heal over, provided the shoot has become strong enough to prevent the danger of breaking out.

Digging or Lifting the Trees.—When nursery-trees have grown sufficiently for removal and transplanting, they may be taken up any time between the cessation of growth in autumn and its recommencement in spring, when the air is not freezing and the ground is open. If a whole row is to be lifted at a time, the labor may be lessened by first ploughing a furrow away from the row on each side. Then two spades made of steel and strong enough to bear the full weight of a laborer are placed on opposite sides of the tree at a distance of a foot or more from it. The blades, which are at least fifteen inches long, are thrust downward to their full length into the soil under the tree. A lifting motion raises it with the principal roots entire. Spades for this purpose, costing several dollars each, are manufactured only by the best edge-tool makers in the country. Before or at the time of removal the trees should be marked with wooden labels furnished with copper wire to fasten them to the limb. They are made of pine or other suitable wood, about half an inch wide, three inches long, and one-twentieth of an inch thick. A very thin coating of white-lead paint applied just before writing the name with a common black-lead pencil renders the letters permanent; but they will last a year or two if the letters are written on a moistened surface. If written dry they wash out in a few weeks.

Packing for Transportation.—Millions of fruit trees are every year purchased by the farmers of our country. A large majority of these are conveyed long distances from the nursery by railway. Much of their safety from injury on the road and their consequent success when set out, depends on the manner of packing. Trees may be packed so as to open from the bundle or box, after being tumbled over iron rails a thou-

sand miles or more, as fresh, plump, healthy, and uninjured, as the moment they were lifted from the mellow soil; and they *are* sometimes packed so as to become bruised, barked, and hopelessly shrivelled before they have travelled a tenth part of that distance.

Whether encased in bundles or boxes, it is absolutely essential that trees be protected from bruising, and that the roots be kept constantly moist from the moment they are dug up till they reach their destination. The first-named object is accomplished by sprinkling straw through every portion of the mass of trees; and the latter by first dipping the roots in an artificial bed of thin mud, and then imbedding them in damp moss. The mud or the moss alone may answer for very short distances (the moss should, however, never be omitted); but as there are frequently unexpected detentions, the best nurserymen always pack about as well for a journey of fifty miles as for two thousand. The additional labor is but small—the benefit may be great.

Packing in boxes, which is always best for long distances, does not require so much practice, although as much care, as in bundles. If the trees are all well encased in straw, or properly protected by it on every side and through every part; the roots shielded from the dry air as already stated; and sufficient pressure given to them to prevent chafing and rattling, they cannot become easily injured. The boxes need the additional strength of iron hoops at the ends and, if eight or ten feet long or more, at intervals between.

To pack a bundle or bale, first provide two simple blocks of wood, like that shown in Fig. 207, into which two diverging stakes are inserted, loosely, so as to be withdrawn easily.



FIG. 207.

Place these a few feet apart, to form the trough for building the bundle. Lay the trees in this trough, perfectly parallel, and with the roots together, sprinkling straw among the stems and branches, and damp moss among the roots as the bundle progresses, until enough are ready. Fifty medium-sized trees will make a fair-sized bundle. Then tie it up with twisted-straw or willow bands, as tightly as one man can conveniently draw. This may be facilitated by using first a broad leather strap to draw the bundle together. The strap

may be two inches wide, eight feet long, with a buckle. The bundle is then ready for receiving the straw.

Next, place upon and across the little truck or wagon represented in Fig. 208, four strings or cords, then a layer of rye-straw, to form the outside coating. As the bundle is longer than the straw, the latter must be spliced, which is effected by first placing a layer toward the place for the roots of the trees, and then another layer overlapping this, toward the

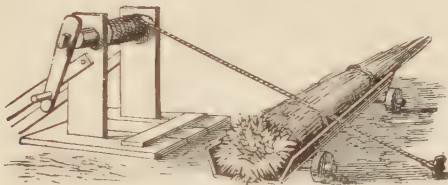


FIG. 208.

tops. Place within the side-boards other portions of straw, and finally cover the top, observing now to lay the straw first on the tops, and lastly on the roots. Then tie together the ends of each of the four strings, which will hold the straw in place. Raise the bundle a few inches by placing beneath it short pieces of scantling, to admit the passing the cord under



FIG. 209.

Then apply the rope connected with the windlass, as shown in Fig. 208, by simply passing it once around the trees. A few turns of the crank will draw the bundle with great force compactly together—at which place pass a strong cord (one-fourth or one-third of an inch in diameter) and secure it by tying. Slacken the rope; move truck a foot, tighten the rope again, and add another cord. In this way proceed from bottom to top, till the straw is so firmly secured by the cords, that no handling, however rough, can displace it. By tying each coil, the rest will hold the straw if one happens to become worn off or cut. Add moss to the exterior of the roots, encase the moss in damp straw, and sew on a piece of strong sacking or gunny-cloth, and the bundle is completed, as shown in Fig. 209.

The former practice among nurserymen was to draw the

bundle together by stout pulling by hand; but the mode here shown, by the use of a windlass, is not only many times more expeditious but much better—as it was formerly almost impossible to bind on the straw in so firm and secure a manner as to withstand all the thumps and rough-and-tumble handling of modern railway hands without displacement.

The following dimensions may be useful to those who wish to construct this packing machinery; windlass three feet high to top; posts fifteen inches apart inside; cylinder four inches in diameter; rope about eighteen feet long. The truck is about two feet wide between the wheels, eight feet long; the axles six feet apart; wheels seven inches in diameter.

When trees are always boxed, they may be secured advantageously in small bundles by this mode for placing in the boxes.

Convenient dimensions for boxes, where large quantities are to be packed, are two and a half feet square and nine feet long. They should be made of light and strong boards, and if sound half an inch in thickness will answer. Four series of battens will be necessary for the length—two at the ends, and the others at intervals of three feet between. Good battens are made of elm or other wood of equal hardness and toughness, which may be sawed for this purpose into strips two and a half inches wide and an inch and a fourth in thickness. When the boards are well nailed to these battens, the whole forms a stout box. When closely and solidly packed the lid is nailed on, and iron hoops are nailed on the outside against every batten, and extending around the box. The direction is then written distinctly with a mixture of lamp-black and turpentine, or of lamp-black and rock-oil. The following materials should be procured beforehand for packing: Boxes, with iron straps or hoops for the corners; moss, for the roots; straw, for the tops; labels, for designating the sorts; flag, oziers, or rye-straw, for tying bunches; large labels of cloth, parchment, or wood, for designating bunches; lamp-black and turpentine or rock-oil, and brush for marking boxes. If the trees are to be packed in bales or bundles, provide long straight rye or other straw, baling-cord, gunny-cloth or Russian mats, sewing-twine, large packing-needles, directing-labels, white-lead paint, and soft pencil.

After the crop of nursery-trees is removed from the ground another one should not be planted in the same place until the soil has fully recovered from the exhaustion of the first. An intermediate crop of clover turned under for manure is found useful. There should be an interval of at least two or three years before occupying the ground again with nursery; although a less time is often given in connection with heavy manuring.

The reasons for the failure of trees to grow well on "treed" land has been the subject of much discussion. By many it has been supposed that the first crop of nursery trees exhausts the land of some element which trees need. This notion is mostly given up. It is no doubt true that the trees use first that part of the plant-food which is most readily available, but the amount of nitrogen, potash, and phosphoric acid which they consume is small as compared with that required by wheat. Probably the largest factor in the matter is the loss of humus in the soil consequent upon three to five years of clean tillage without the addition of manure or the turning under of green material. It has been found that a thorough dressing of manure will sometimes make it possible to follow trees with trees at a profit.

CHAPTER XII.

DESTRUCTIVE INSECTS.

INSECTS are among the most formidable enemies to successful fruit-culture. The losses occasioned by the plum curculio alone amount to more than a million of dollars annually. Orchardists are sometimes deterred, by the attacks of this insect, from attempts to raise the apricot, nectarine, peach, and plum; and the market supply of apples and pears is often much disfigured by it. The apple-worm, or codling-moth, is even a more formidable insect pest. New York fruit-growers alone yearly furnish \$2,500,000 worth of apples and \$500,000 worth of pears to feed this insect; and other similar apple-growing States report nearly as large an annual loss from its ravages. The depredations of many other insect pests, like the apple-tree and the peach-tree borers, the canker-worms, the tent-caterpillars, the apple maggot, and the pear psylla, each causes annual losses amounting to several hundred thousand dollars.

As a general rule those remedial measures are of little value, which attempt merely to repel insects without destroying them. Experiments show that rarely is an insect repelled from attacking any part of a plant by the application of odorous substances, like carbolic acid, tar, etc.

How insects eat.—Another very important fact which fruit-growers must understand is that all insects do not eat in the same manner. Many, like the currant worms or the plum curculio, have two pairs of horny jaws, which they work from side to side and bite off or chew and swallow solid particles of their food; while several of our worst fruit-pests, like the scale-insects or pear psylla, have mouth-parts built on an entirely different plan. Their jaws are modified into long, fine

bristles which are worked along a groove in a supporting beak or elongated lower lip. These insects place the point of this beak on the surface of the plant, force the bristles into the tissue, and then, by the help of a muscular box in the throat, they draw or suck up along the beak the liquid juices from the interior of the plant.

One can readily see how the biting or chewing insects are killed by putting a poisonous powder or spray on the surface of the plant attacked; particles of the poison would be taken into the body with the solid food in eating. But a sucking insect can eat only liquid food, which it gets from the interior of the plant; hence it could not eat a poison put upon the surface. And as it is not possible to poison the internal tissues or juices, one is forced to use something besides poisons to kill sucking insects. They can be killed by suffocating them with a gas, like hydrocyanic acid gas, or with a powder, like pyrethrum, which stops up their breathing-holes, or with some liquid, like kerosene or a soap solution, which kills by soaking into their body or in the same way as the powders. Many pounds of Paris green have been wasted in trying to feed it to sucking insects.

Fruit-growers can readily determine if an insect is chewing or sucking its food. If of the former class, then aim a poison spray at the part of the plant where it is feeding; but if it is a sucking insect, then aim an oil or soap spray at the insect itself.

There are a hundred or more different kinds of injurious insects, and equally as many diseases, which sometimes seriously interfere with the growing of a profitable crop of fruit. Most of the serious or standard insect pests and the more common diseases which are met with by the fruit-grower will be found treated of in this chapter; the others which occur less frequently, or become serious in their effects in restricted localities, it has not been considered necessary to treat of here. In all such cases advice should immediately be sought from the State Agricultural Experiment Station. (For list see chapter xvi.)

In previous editions of this work no logical plan was followed in discussing the destructive insects. We have thought it advisable to change this and first discuss the apple pests,

beginning with those affecting the roots, then the trunk and bark depredators, following with those feeding on the buds and leaves, and finally discussing those which infest the fruit. The insects which affect the pear, plum, peach, cherry, quince,

grape-vine, currant and gooseberry, raspberry and blackberry, and strawberry will be discussed in the order in which they are named, and in each case the method outlined for the apple insects will be followed.

The Woolly Aphis (*Schizoneura lanigera*).—This reddish-brown plant-louse, covered with a flocculent waxy secretion (Figs. 211 and 212) works both on the roots, where it forms knotty enlargements (Fig. 210), and on the branches, where it causes roughened scars. It attacks the apple only, and some varieties, the Northern Spy, for instance, are quite immune from it. Nursery stock and young trees are often seriously damaged, while in most parts of the country well-established bearing trees are rarely noticeably injured. It has quite a complicated life-history.



FIG. 210.

FIG. 211.

The Woolly Aphis.

FIG. 210.—Root illustrating deformation by the aphid. FIG. 211.—Portion of root with aphids on it. FIG. 212.—The Root Louse, female. Figs. 210 and 211 natural size; Fig. 212 much enlarged (U. S. Div. of Entomology.)

Most of the lice are wingless, but in the fall many winged forms appear, and these are one of the means by which the insect is spread. It is also widely distributed on nursery stock.

The aerial or branch form of the insect does little injury,

and is easily killed with kerosene emulsion, a strong soap solution, or a tobacco decoction applied in a forceful spray. The root form is much more difficult to reach. Badly infested nursery stock should be destroyed. The roots of slightly affected stock should be dipped for a few seconds in water kept at a temperature of 130 to 150 F., or in a warm, strong soap solution, before it is planted. Recent experiments show that finely-ground tobacco dust is very effective if placed in a small furrow along either side of nursery rows or distributed at the rate of from two to five pounds per tree for a distance of two feet from the crown, after first removing from four to six inches of soil. The tobacco dust is cheap, and has considerable fertilizing value.

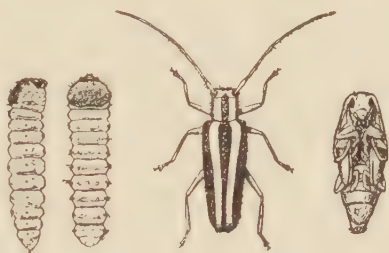
The Round-Headed Apple-Tree Borer (*Saperda candida*).—This insect enters the tree and burrows into the solid wood near the surface of the earth. It is a dangerous enemy; for while only a few small holes are visible in the bark outside, it may have perforated the wood internally in all directions.

Not only the apple-tree, but the quince, mountain-ash, and hawthorn suffer greatly from the attacks of this insect.

The parent insect is a beautiful, brown-and-white striped beetle (Fig. 215), about three-fourths of an inch long, which flies at night. It

deposits its eggs in June and later in slits cut in the bark, usually near the surface of the ground. The egg-stage is said to last about twenty days. The first indication of the work of the larva is the appearance of a small round hole, made visible by the ejected dust.

The young larvæ tunnel under the bark and feed upon the sapwood, gradually working their way upward and afterward downward. During the second season the larvæ attain about



FIGS. 213 and 214.

FIG. 215.

FIG. 216.

The Round-headed Apple-tree Borer.

FIGS. 213 and 214.—The grub. FIG. 215.—The beetle. FIG. 216.—The pupa. All natural size. (U. S. Div. of Entomology.)

half their growth, still living on the sap-wood. They cease feeding during the winter and remain in their burrows beneath the surface of the soil. By the end of the second year they have penetrated deeper into the solid heart-wood, and their burrows are closely packed behind them with their castings. After another winter's rest they continue their work in the solid wood, and toward the end of the season gnaw outward to the bark. With the aid of its castings a cell is then formed in which the full-grown larva (Figs. 213 and 214) remains until spring, when it transforms to a pupa (Fig. 216). The pupal stage is said to last about twenty days, and in May or June the pretty beetles emerge through a smooth, round hole cut with their powerful jaws.

This borer is a very difficult insect to control. It is nearly impossible to save a young tree. When small, the larva may be cut out with the point of a knife. If deeper in the wood, it may be extracted or punched to death in its hole with a flexible wire.

It will avail nothing to inject any substance into the large round holes made by the beetles in emerging from the tree. But it is reported that if kerosene be applied wherever the castings of the larva are seen sticking through the bark, the oil will permeate the burrow and kill the larva.

Some have successfully destroyed similar borers in their burrow by injecting carbon bisulphide from an oil-can into the openings from which castings are protruding and then plugging the hole with putty or hard soap; the deadly fumes of this liquid penetrate all through the burrow and quickly kill the borers. It is a difficult matter to prevent this borer from getting into a tree. Several thicknesses of newspaper or tarred paper carefully wrapped about the base of the tree and tied often forms quite an effective barrier. The many different washes recommended afford but little protection in our experience. Examine the trees twice each year, in May and September, and dig out or destroy all larvæ which can be located. Clean culture will help in the warfare against borers.

The Flat-headed Apple-tree Borer (Chrysobothris femorata).—This is usually a much less dangerous, though more abundant, insect than the preceding species. The pretty beetles (Fig. 218) are day-fliers. They attack by preference

sickly trees; they inhabit both the trunk and limbs of a tree, and, besides apple, pear, peach, and apricot trees, they also attack a variety of forest trees. They are chiefly injurious to young trees.

The eggs are laid in crevices of the bark, and the larvæ (Fig. 217) get their growth in one year, living mostly just beneath the bark. The pupal stage (Fig. 220), lasting about three weeks, is passed in a cell made in the solid wood. The beetles emerge in May and June through elliptical-shaped holes.

Trees badly infested with this borer should be burned at once. The remedial measures advised for the round-headed borer may also be applied against the flat-headed species.



FIG. 217. FIG. 218. FIG. 219. FIG. 220.
The Flat-headed Apple-tree Borer.

FIG. 217.—Larva or grub. FIG. 218.—Beetle.
FIG. 220.—Pupa. All twice natural size. (U. S. Div. of Entomology.)

SCALE-INSECTS are minute sucking insects, which now rank among the most destructive fruit pests in many parts of the country. We can here discuss only a few of the more common ones.

The Oyster-shell Bark-louse (Mytilaspis pomorum).—This scale (Fig. 222) is very common on apple-trees all over the country; it also attacks many forest trees, and it is found all over the world. It is shaped somewhat like an oyster-shell, and is nearly the color of the apple bark. In northern latitudes there is but a single annual generation of the insect; in the South there are two. It usually confines its attacks to the bark of younger branches, but sometimes occurs on the fruit in the North.

If the scale be tipped over during the winter, it will present the appearance seen at *a* in Fig. 221; that is, the shrivelled body of the female is tucked away at one end, and from 30 to 90 white eggs occupy the rest of the scale. The winter is passed in the egg, and the young lice usually hatch in the

latter part of May. They travel about over the bark for a few hours, and when a suitable place is found to insert their beak, they begin feeding, and never move from the spot during the rest of their life. They soon begin to secrete the scaly covering, which gradually increases in size with the growth of the tender body of the insect underneath. When fully grown early in the fall, the female deposits her quota of eggs under the scale and dies. The male insect is provided with wings, and

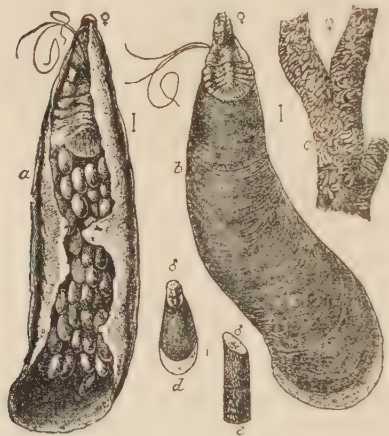


FIG. 221.

FIGS. 222 and 223.

The Oyster-shell Bark-louse.

FIG. 221.—Female scale from below, showing eggs. FIG. 222.—The same from above, greatly enlarged; *d*, male scale, enlarged. FIG. 223.—Female scales. (U. S. Div. of Entomology.)

is developed under a much smaller scale (Fig. 222, *d*). The old scales may remain on the bark for a year or more, and oftentimes the living scales may be so numerous as nearly to cover the bark, as shown in *c* in Fig. 223. Young trees are often much weakened from its attacks, but it rarely kills apple-trees.

One should scrape off all of the scales practicable when the tree is dormant, thus removing the eggs, which are difficult to reach and kill with any wash. Then wait until about May 15th, or as soon as the

young lice can be seen crawling on the bark, and drench the bark with kerosene emulsion, or a whale-oil soap solution of one pound in five gallons of water, or use a kerosene-water pump with ten per cent. of kerosene. A second application may be necessary a week or ten days later.

The *Scurfy Bark-louse* (*Chionaspis furfurus*) is another scale very commonly met with in orchards, especially on apple and pear-trees. As shown in Fig. 224, it is shaped somewhat like the oyster-shell bark-louse, and has a similar life-history, but

its scaly covering is nearly white in color. It is two-brooded even in New York, and from ten to seventy-five purple eggs winter under each female scale.

This scurfy scale is best controlled by the same methods as the preceding species.

San José Scale (*Aspidiotus perniciosus*), Fig. 229.—This insect first appeared in California many years ago. About 1887 it was introduced into the Eastern United States on nursery stock; and it has since attained international importance, and has been widely distributed throughout this country. It is recognized everywhere as a most destructive and dangerous fruit pest. It spreads all over the

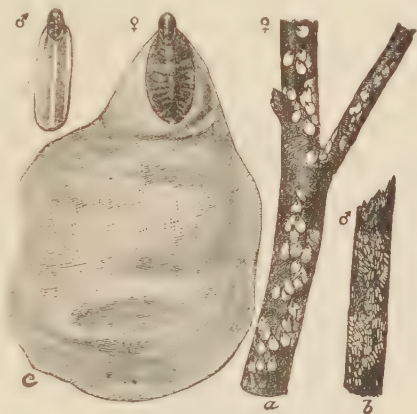


FIG. 224. FIG. 225. FIG. 226.
The Scurfy Bark-louse.

FIG. 224. c, Female; d, male. FIG. 225. - Female scales. FIG. 226. - Male scales. Figs. 225, 226, natural size; Fig. 224 enlarged. (U. S. Div. of Entomology.)

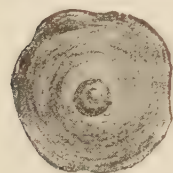


FIG. 227.—San José Scale. (Greatly magnified.)

tree and fruit, at times literally covering it—in such cases often killing it, if undisturbed, in a few years. It thrives on all kinds of fruit-trees, and on the small fruits as well as on most other deciduous trees or shrubs; peaches usually succumb to its attacks more quickly than any other fruit-trees.

It can spread only by direct contact of the living female with a live tree, either from the interlocking of the branches of an infested tree with others, or by being carried from one to another by birds or insects. Infested nursery stock is the most fertile source of distribution. While it is often found on the fruit, there is yet no definite evidence that such fruit was the source of any infestation.

The reason this scale is so much more dangerous than either of the two bark-lice just discussed is because of its greater

power of multiplication. The insect winters in the form of small round black scales scarcely larger than a pin's head. These become full grown in May or June, when they are of a grayish color and nearly an eighth of an inch in diameter. There is no egg stage, the young lice being born alive, and they may become mothers in about forty days. Thus there are from three to five generations of the scales during a season, and as one mother may rear from one hundred to five hundred

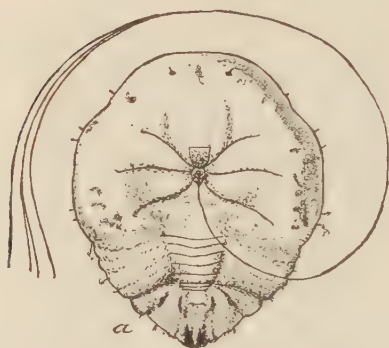


FIG. 228.

FIG. 228.—San José Scale.—Female insect which lives under the scale, greatly enlarged. (Adapted from Howard's figures.)



FIG. 229

FIG. 229.—San José Scale, natural size.

young, it is easy to understand how a few scales may soon cover a tree with their progeny. If one of the scales be tipped over at any time, there will be found the soft, yellow body of the insect itself, as shown in Fig. 228.

Much legislation has been enacted to prevent the spread of or to exterminate this pernicious pest, and much good has resulted from the systems of inspection of nurseries and orchards, but eventually every fruit-grower will have to work out his own salvation. Fruit-growers should understand that the insect can never be exterminated in any seriously infested orchard or locality without destroying the trees, but it can be, and some are controlling it as effectually as they are some other fruit pests.

It can best be treated when the trees are dormant, but much

can be done also by spraying the trees several times during the growing season with a kerosene-water pump, using about 20 per cent. of kerosene, or with whale-oil soap, about one pound in four or five gallons of water. For a winter wash a solution of good whale-oil soap, two pounds in one gallon of water, has been found very effectual. Pure kerosene is also effective, but often injures the tree. Crude petroleum applied as a winter wash, in a 25 to 40-per-cent. mixture, with a kerosene-water pump, is also proving a valuable addition to the insecticidal batteries that may be directed against this pest. Very effective work has also been done in the East with the California wash of lime, sulphur, and salt.

Fumigation with hydrocyanic acid gas is the most perfect method of controlling the San José scale, but it requires expensive apparatus for orchard work. Nursery stock, however, can be cheaply fumigated, and when properly done, it will prove a great safeguard to the fruit-grower against, not only this scale, but many other injurious insects often sent out by nurserymen.

Lecanium Scales.—These are large, soft-shelled, brown scales about the size and shape of a half pea. There are many species, some of which, like the Black Scale of California, are very destructive. A few years ago one of these *Lecaniums* appeared in overwhelming numbers in several plum orchards in western New York, and many bearing trees were killed. Climatic conditions and its insect enemies, however, soon turned the tide, and the pest may remain in its former obscurity for many years.

Such scales can often be successfully controlled by spraying the trees when dormant with kerosene emulsion, one part to four of water; doubtless a kerosene-water pump, using 20 or 30 per cent. of kerosene, or whale-oil soap, one pound in two to four gallons of water, would prove equally effectual.



FIG. 230.—The Peach Lecanium Scale, natural size and enlarged.

The Apple Aphis (*Aphis mali*) is the little green plant-louse which often appears in large numbers on the opening buds of apple in early spring. These hatch from shining black eggs laid on the bark in the fall. Usually but little damage is done by the lice on bearing trees, but in nurseries it often proves a serious pest by badly curling the leaves and checking the growth of the stock. Winged forms may leave the apple-tree and start a series of summer generations on June grass.

They may be destroyed by a solution of whale-oil soap, or even by common soap-suds. It may be applied with a spray pump; or young trees in the nursery and their branches may be bent over and immersed in the liquid contained in a large pail. It should be repeated as often as they reappear.

The Bud Moth (*Tmetocera*



FIG. 231.—The Bud Moth, twice natural size.



FIG. 232.—Work of a bud moth caterpillar in an opening leaf bud, natural size.

ocellana).—This insect does much damage in many sections of the country. A little brown caterpillar comes from a silken home, in which it hibernated, and proceeds to eat into the opening buds. It soon ruins the opening flowers and ties them and the leaves together into a nest, as shown in Fig. 232. The brown caterpillars get full grown in June, when they measure about half an inch in length, and then soon undergo their transformations to the adult insect, the moth, shown in Fig. 231. The moths soon lay their eggs on the leaves and the young caterpillars mine in the leaves until time to go into winter quarters in their silken homes on the branches near the buds.

It requires intelligent and persistent work with a Paris

green or other poisonous spray in the spring to control this serious pest; it is usually necessary to make two thorough applications before the blossoms open.

Canker-worms are among the most destructive of apple pests. They are measuring-worms from an inch to an inch and a half



FIG. 233.—Spring Canker-worm.—Larva; female; male.

in length, and finally develop into small moths, the females of which (Fig. 233) have no wings. There are several different kinds of canker-worms, and they often work together in the same orchard. They consume the foliage, except the larger leaf veins, and give the trees a scorched appearance from a distance, so that the insects are known as "fire-worms" in some localities. We have seen thousands of acres of apple



FIG. 234.—Fall Canker-worm.—Female; male; larva.

orchards in Western New York defoliated by these pests in a single season. They spread rather slowly from orchard to orchard.

In some localities the kind known as the fall canker-worm (*Anisopteryx pometaria*) (Fig. 234) is the most numerous, while in other sections the spring canker-worm (*Paleacrita vernata*) (Fig. 233) far outnumbers any others. At least two other kinds may also occur in injurious numbers; they are the lime-tree winter-moth *Hybernia tiliaria*, and Bruce's canker-worm *Rachela bruceata*.

The moths of the fall canker-worm and of the two last-named species emerge in the fall, while the spring canker-worm moths appear in March and April. In each case the wingless females have to crawl up the tree, where they lay their eggs on the bark. The eggs of each species hatch about the same time in the spring, as the leaves begin to unfold, and the caterpillars feed ravenously for about a month. They then disappear into the ground a short distance, where they transform to pupæ, finally to emerge as moths in the fall or spring.

Canker-worms are not difficult pests to control when one understands their habits, so that the warfare can be waged at the proper time. The caterpillars can be killed after they have begun work in the spring by thorough, honest efforts with a spray of Paris green or some similar poison at the rate of one pound in one hundred gallons of water or Bordeaux mixture. It will require several applications where the pests are very numerous, and it is all-important to apply the poison before the caterpillars get two-thirds grown; it always takes much less poison to kill a small caterpillar than one nearly full-grown.

Orchards which are well cultivated from year to year are rarely seriously infested with canker-worms. Doubtless many of the pupæ in the soil are destroyed by the cultivation.

As the female cannot fly, various expedients for preventing it from ascending the tree from the ground in the fall or early spring have been devised. Bands of sheathing-paper six or eight inches wide are often tacked around the trunks of the trees, and then smeared with tar, or any other sticky substance which will not lose its viscosity. Before putting on the bands smooth off the bark, so that there shall be no crevices under the paper through which the tiny moths may crawl.



FIG. 235.—Common-Sense Wire Trap for Canker-worms.

Another simple patented device, shown in Fig. 235, has been extensively and successfully used in Western New York. This Common-Sense Wire Trap, when properly put on and cared for while the

moths are ascending the trees, forms a simple, cheap, and very effective barrier. We have seen such a trap filled with the moths crowding and pushing each other until many of them were killed; in a badly infested orchard we have seen at least a thousand moths trying to ascend a single tree in one evening.

Tent-caterpillars are serious enemies to apple-trees and some forest trees in most parts of the country. They have their seasons of increase and decrease.



FIG. 236.—Apple-tree Tent-caterpillars on their Tent, natural size.



FIG. 237.—Egg-mass of Tent-caterpillar.

Some years they nearly strip whole orchards; and again they diminish in numbers in successive years, till few can be found.

The species which usually does the most damage to fruit-trees is shown in Fig. 236, and it is known as the American or *Apple-tree Tent-caterpillar* (*Clisiocampa americana*). In the spring, as soon as the leaf-buds of the apple begin to open, the little hairy caterpillars hatch from their varnished egg-ring (Fig. 237), where they have spent the preceding eight or nine months. They feed for five or six weeks and attain the size

shown in Fig. 236. Those we have watched fed mostly at night, early morning, or at midday. They are social caterpillars, and each family or colony lives together in a silken tent or nest, which they begin in a near-by crotch soon after they hatch, and gradually enlarge as they need larger quarters.

These tents or "signboards" are conspicuous objects in an

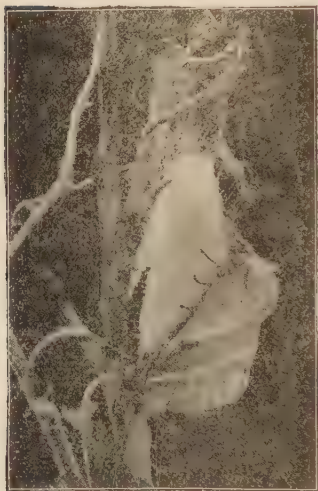


FIG. 238.--Female Moth of Apple-tree Tent-caterpillar on Cocoon, natural size.

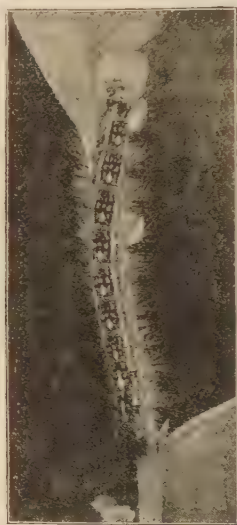


FIG. 239.—A Forest Tent-caterpillar, natural size.

orchard. The tent serves as a home from which the caterpillars issue at feeding times and forage over the tree, spinning a silken thread wherever they go. When they get their growth early in June, they find some secluded cranny in a near-by fence or elsewhere and spin about themselves a coarse, white, silken cocoon intermixed with a yellow powder (Fig. 238). In this cocoon they change to pupæ, and finally transform to reddish-brown moths (Fig. 238) in about three weeks. The moths emerge and lay their peculiar rings of eggs (Fig. 237) around the smaller branches early in July; each egg-mass contains about two hundred eggs, which are covered by

a vesicular, water-proof varnish. There is thus but one brood of the caterpillars each year, and by far the largest portion of the insect's life is spent in the egg, usually from July until the following April.

Maple shade trees and sugar-bushes, as well as some other forest trees, sometimes suffer severely from hordes of large hairy caterpillars, which are closely allied to the apple-tree tent-caterpillar, and have been called the *Forest Tent-caterpillar* (*Clisioscampa distria*). One of them is shown in Fig. 239. Sometimes this insect invades orchards and proves a more serious enemy than its near relative. Its life-history is practically the same as that of the apple-tree tent-caterpillar, but the two species are easily distinguished in the egg, caterpillar, and moth stages.

The egg-rings of the forest species are shorter and blunter at the ends; the caterpillars have a row of whitish spots down the middle of the back instead of a continuous white stripe; the moths have an oblique band of a deeper tint across each front wing, while those of the apple-tree tent-caterpillar are crossed by a similar band bordered with narrow white stripes. The popular name of forest tent-caterpillar is misleading, as the caterpillars do not make a tent, but simply spin a thin silken mat or carpet on the bark where the whole family rests when not feeding.

Several parasitic and predaceous insects prey upon this forest species and usually keep it in subjection. In sugar-bushes and other forest lands man must depend largely upon these enemies to control the pest.

The best and cheapest method of combating both the apple-tree and the forest species of these tent-caterpillars is to cut off the small branches which bear the eggs, during autumn or winter, and burn them; do not leave them on the ground, for they will often hatch as readily there as on the tree. A most convenient implement for this work is a tree-pruner (see page 102). The eggs are seen at a glance after a little practice. Every ring of eggs thus removed, which is done in a few seconds, totally prevents a nest or colony of caterpillars in the spring, and is far more expeditious and effectual than the usual modes of burning the nests, or brushing off the caterpillars with poles at a later period. Enlist the

children in this work by prizes, or by paying a certain amount for the collection of unhatched egg-rings at any time between August 1st and the following April; this is especially applicable in villages where shade trees are infested.

Where orchards are thoroughly sprayed with poisons for other pests, the tent-caterpillars are usually destroyed at the same time.

The caterpillars of the forest species quickly drop from the tree when it is suddenly jarred, thus offering a very practicable method of collecting and killing them in orchards, and especially on village shade trees. When the apple-tree tent-



FIG. 240.

FIG. 241.

caterpillars and their nests or "signboards" are small, a whole family can be quickly wiped out and destroyed with an old mitten or rag in one's hand. These nests should be looked upon as signboards of shiftlessness, for not many injurious insects can be so easily controlled.

Yellow-necked Apple-tree Caterpillar (Datana ministra).—The larva of this moth, which usually appears in July or August, when full grown, is from an inch and a half to two inches long. A family of them is so voracious that if undisturbed they will soon defoliate a small tree. Though they spin no web, they have a peculiar habit of collecting together in masses in the noticeable position shown in Fig. 240. At such times they may easily be destroyed by burning, or by brushing them off on to the ground and killing them. The perfect insect is shown in Fig. 241.

The Apple Maggot (Trypeta pomonella) Fig. 242, lives in the pulp of the apple and tunnels it in winding channels, ruin-

ning it except for feeding to stock. It is a footless maggot, one-fifth of an inch long, and changes to a pretty two-winged fly. It prefers the thin-skinned summer and fall apples to the winter varieties, but no varieties are exempt from attack. It has spread over the Eastern and Northern States, where it has become a very serious pest, and is sometimes called the "railroad worm."

The flies begin to appear early in summer and insert their eggs through the skin of the partially grown apples. The fact that the maggots rarely, if ever, leave the fruit while it remains on the tree affords practically the only vulnerable place in the insect's life. After the apple falls or is picked, the full-grown maggots crawl out and change to the pupal state in the ground, or in the receptacles in which the fruit may be stored. It hibernates in the pupal stage.

The insect is thus out of the reach of the spraying pump, and the most efficient remedy is to turn sheep or other stock into the orchard, which will devour the fruit as soon as it falls, or to pick up at once and feed out or bury deeply the fallen fruit in gardens.

The Apple-Worm or Codling-Moth (*Carpocapsa pomonella*).—This insect has become the most formidable enemy of the apple in the United States. It also does much damage to the pear, and rarely attacks some of the stone-fruits. In many orchards it ruins nearly the whole crop. "Wormy" apples, most of which are caused by this insect, have been mentioned in agricultural writings as far back as the time of Cato, nearly two hundred years before the Christian era. The insect is now a cosmopolitan pest, occurring in nearly every corner of the globe where apples are cultivated. It doubtless appeared



FIG. 242. Apple Maggot.—a, Female; b, male; c, maggot. (After Harvey.)

in America some time before 1750, and now occurs in nearly every apple-growing section.

The codling-moth appears in the spring about the time the blossoms are falling from apple trees, and after a few days glues its tiny scale-like eggs (Fig. 246) on to the skin of the young fruit, or even the adjacent leaves, where they hatch in about a week. The little apple-worm usually finds its way into the blossom-end, where it takes its first meal and where it remains feeding for several days, finally eating its way to



FIG. 243.—The Codling-moth, natural size. (From Lodeman's *Spraying of Plants*," by permission of The Macmillan Company.)

the core (Fig. 243). In about three weeks it gets nearly full-grown and makes an exit tunnel to the surface, closing the outside opening of the tunnel for a few days while it feeds inside. Emerging from the fruit, it usually makes its way to the trunk of the tree, where it soon spins a cocoon under the loose bark. Usually the first worms thus to spin up in June or July soon transform to pupæ, from which the adult insect emerges in about two weeks, and eggs are soon laid on the leaves or the skin of the apples, from which a second brood of the worms hatches. In most of the more northern portions of the United States only a part of the worms of the first brood pupate or transform to moths the same season, but in the central, western,

and southern portions there is a complete second brood, and in some portions possibly even a third brood of the worms annually. In the fall all the worms spin cocoons wherever



FIG. 244.—Just the Time to Spray for the Codling-moth.



FIG. 245.—Calyx Cup Nearly Closed.

they may be, either in the orchard or in storerooms, and remain curled up in them as caterpillars until spring opens, when they transform, through the pupa, to the moth (Fig. 243), thus completing their yearly life-cycle.

No panacea for the codling-moth has yet been found, but by thorough work with a Paris green spray one can often save at least 75 per cent. of the apples that would otherwise be ruined by the worms. Where two or more broods of the insect occur during the season, as in Kansas, Nebraska, Oregon, New Mexico, and neighboring localities in the West, and in the South, the poison spray is not so effective, for, although 75 per cent. of the first brood of worms may be killed with



FIG. 246.—Calyx Cup Closed and too Late to Spray Effectually (note the tiny egg on skin of apple).

the spray, the few worms left will form a sufficient nucleus for a large and very destructive second or third brood; in these localities the best that can be advised at present is to supplement the poison spray with the old banding system.

Various methods of trapping the worms when they are about to spin their cocoons have been practised with some degree of success. The most simple and as effective as any is to wrap a band of straw, or two or three folds of old burlap around the trunk of the tree. Put on the bands about the middle of June and examine and destroy the cocoons found in them every ten days until about September 1st when they need not be examined again until after the fruit is gathered.

To use the poison spray the most effectually one must understand that it is necessary to fill the blossom-end of each apple with poison within a week after the blossoms fall, for this is where the little apple-worm gets its first few meals, and it is practically our only chance to kill it with a spray. Watch the developing fruit after the petals fall, and be sure to apply the poison before the calyx lobes close (as shown in Figs. 244 and 245), for while *the falling of the blossoms is the signal to begin spraying, the closing of these calyx lobes a week or two later is usually the signal to stop spraying.*

The Pear Psylla (Psylla pyricola), one of the jumping plant-lice, has recently attained first rank as a pear pest in the eastern United States, and it occurs westward to the Mississippi River. It attacks only the pear-tree and has nearly ruined some pear orchards in New York; trees of all ages and varieties are attacked. Most of the damage is done by the nymphs (Fig. 248), which are only about one-tenth of an inch in length, but they often appear in incredible numbers, and congregating in the leaf-axils or on the fruit stems they soon sap the life of trees to such an extent that but little growth is made and the fruit sometimes drops when half-grown. The nymphs secrete large quantities of a sweet, sticky liquid, called "honey-dew," which spreads over the branches and leaves, sometimes even dripping from the trees. All through this honey-dew a black fungus grows, so that the bark of badly infested trees has a black, sooty appearance; this is usually good evidence at any time of the year that a pear-tree has suffered from the psylla. The adult insects (Fig.

247) are active creatures, quickly jumping and flying out of reach when approached; they feed, but not enough to do noticeable damage.

The insect hibernates in the adult stage, hidden in the crevices under the loosened bark on the trunk and large limbs of the pear trees. During warm days they often crawl about on the branches and trunk. They are not easily seen as they are so small, and their color so closely imitates the bark. In



FIG. 247.



FIG. 248

The Pear Psylla. Adult and nymph, much enlarged.

April these adults lay their curious, orange-yellow eggs in the creases of the bark about the bases of the terminal buds of the preceding year's growth. By the middle of May, or about the time the first leaves are expanding, most of the eggs have hatched, and the little nymphs are at work sucking out the life of the tree. In about a month these nymphs have developed into adult psyllas, which are smaller than those which hibernated, and they soon lay eggs on the leaves for another brood. At least four broods of the insect develop in a season in New York and probably five in Maryland. Many pear-trees are so much weakened by the drain of so many little pumps sucking the sap that they do not have enough vitality to survive the winter. The insect is thus both a serious menace to the tree and to the crop of fruit.

It is very important that this pest should be checked early in the season, as the psyllas can be more easily hit with a

spray then, and every member of the first brood that is killed greatly reduces the numbers of the following broods. In badly infested pear-orchards it would pay to drench the bark of the trees in winter with a spray of whale-oil soap, dissolving about one pound in two or three gallons of water, and to each hundred gallons of this add ten gallons of crude petroleum. With this spray, or with a kerosene-water pump, using 30 or



FIG. 249.—The Pear Slug. *a*, Adult saw-fly; *b*, slug with slime removed; *c*, same in normal state; *d*, infested leaves, natural size; *a*, *b*, *c*, much enlarged. (U. S. Div. of Entomology.)

40 per cent. of kerosene, most of the hibernating psyllas could be killed, and thus the pest be checked for the coming season. The nymphs and many of the adults can be killed in summer by thorough work with a spray of whale-oil soap, one pound in five gallons of water, or with a kerosene-water pump, using about 10 or 15 per cent. of kerosene. Sometimes the nymphs become covered with honey-dew, and it is difficult to hit them with a spray. Hence, just after a hard shower is a good time to make the application, as much of the honey-dew will be washed off. Prompt and thorough work in May or early June on the first brood is necessary if one is to control this pest. It is a very difficult matter to check it if it is let alone until later in the season.

The Pear or Cherry Slug (Eriocampoides limacina).—This

European pest has now made its way into practically every civilized country. It is one of the saw-flies, the adult (Fig. 249 *a*) being glossy-black and not quite so large as a house-fly. These flies emerge from the ground in May and insert their eggs into the tissues of the leaves from the under surface. The eggs hatch in about two weeks. The dark green larvæ (Fig. 249 *b c*) are snail-like in form, and their body is covered with a slimy olive-colored liquid; these characteristics have given them the popular and apt name of "slugs." The slugs feed on the upper surface of the leaves, skeletonizing them, as shown at *d* in Fig. 249.

Although very sluggish in movement, the slugs have an enormous appetite, and often do much damage, especially to young trees. They get their growth in about twenty-five days, go into the ground, and there transform in about two weeks to the saw-flies. A second brood of slugs results in August from eggs soon laid by these flies.

This is a very easy pest to control. The old method was to dust ashes, lime, or road-dust onto the slimy slugs, and it was sometimes quite effectual; but many of the slugs would simply moult off their dusted skin and thus escape. They feed so openly on the upper surface of the leaves that a dose of poison can be easily included in their menu. Dust on some hellebore if only a few young trees are infested, or spray infested trees with Paris green or some similar poison at the rate of one pound in one hundred and sixty gallons of water, or use it in Bordeaux mixture.

The Pear Midge (Diplosis pyrivora).—This insect was apparently introduced into America from Europe about 1877, being first noticed in Connecticut. It has slowly spread into the near-by States, and has become in many localities the most destructive enemy to the fruit of pear; it attacks no other fruit.



FIG. 250.—The Pear Midge. *a*, Adult; *b*, maggot; *c*, pupa; all much enlarged. (Adapted from Riley.)

The adult insects, which resemble miniature mosquitoes (Fig. 250 *a*), emerge from the soil beneath the trees early in the spring when the blossom-buds are just bursting. Before the blossoms get open, the little flies or midges insert their long



FIG. 251.—Work of the Pear Midge. Section of pear showing maggots at work, enlarged; an infested, misshapen fruit; fruit from which the maggots have emerged, natural size.

ovipositor through the closed petals and calyx and lay a dozen or more eggs on the anthers of the flowers. The eggs hatch in four or five days, and the orange or reddish-colored maggots (Fig. 250) enter the open ovary of the embryo fruit, where they feed upon the growing tissues, usually destroying the core and seeds and causing the young fruits to become dwarfed and misshapen, as shown in Fig. 251. The maggots get their growth about June 1st and remain in the fruit until a rain or

other moist conditions cause a rapid decaying and a cracking open of the infested fruit, as shown in Fig. 251. Through the openings thus made the maggots emerge and enter the soil an inch or two, where they make oval, silken cocoons, in which they remain until spring, when they change to pupæ, and soon afterward to the adult flies or midges.

The Lawrence variety of pear, which blooms early, seems to be a favorite with the midge.

The pest seems to be invulnerable to any insecticidal operation, which does not involve the loss of the fruit, until the maggots leave the fruit and enter the ground. Where only a few trees are infested, one could readily distinguish most of the infested, misshapen fruits, and pick them off and destroy them; this should be done before May 15th to be effective. It would pay in certain cases thus to destroy all the fruits on a few trees for a season if an orchard could be thereby freed from the pest.

Experiments give considerable hope that many of the midge maggots can be destroyed in loose sandy soils by an application of kainit, at the rate of one thousand pounds to an acre, about the middle of June. Other experiments on clay soils indicate that such heavy applications of potash salts each year injure the trees, and that thorough cultivation is far preferable to the fertilizers.

The Plum Curculio (Conotrachelus nenuphar).—This native American insect is the cause of most "wormy" plums, prunes, apricots, peaches, nectarines, and cherries. It is usually by far the most destructive insect with which growers of these fruits have to contend, as it often ruins the whole crop unless promptly checked. It also breeds in apples and pears, but not so freely as in the stone-fruits; during years when the latter fruits are a light crop it often becomes a serious pest on apples. The insect is widely distributed throughout the country east of the Rocky Mountains, but has not yet invaded the Pacific Coast States.

The adult insect (Fig. 252) belongs to a family of beetles known as curculios, weevils, or snout-beetles. It is a small, rough, blackish beetle, about one-fifth of an inch long, with a black, shining hump on the middle of each wing-case, and behind this a band of dull ochre-yellow color, with some

whitish marks near the middle. These curculios hibernate in any sheltered location, as in hedge-rows, rubbish piles, old stone-walls, or a near-by forest; in consequence of this, fruit-growers often notice that the portion of their orchard nearest



FIG. 252.—The Plum Curculio. Adult ; larva ; pupa ; all enlarged.

such places suffers the most from the insect. The curculios come from their hiding places soon after the fruits are set, or when they are not larger than peas, and soon egg-laying begins.

This is an interesting operation. Alighting on a fruit, the mother beetle, with her jaws, which are situated at the end of the long snout, makes a small cut through the skin of the fruit and runs her snout obliquely into the flesh just under the skin and gouges out a cavity large enough to receive her egg. Then turning around, an egg is dropped into the hole, and again turning, she pushes it into the cavity with her snout. Just in front of this hole the mother now deftly makes a crescent-shaped slit (Fig.



FIG. 253.—The Plum Curculio's Crescent Mark on a Cherry, natural size.

253), which she extends obliquely underneath the egg-cavity so as to leave the egg in a sort of a flap of flesh, apparently her object being to prevent the growth of the fruit from crushing her very tender egg. This whole operation requires about five minutes. One female is said to deposit from fifty to one hundred eggs—a few each day. One

can readily see the eggs with the naked eye by carefully removing the skin of the fruit behind the crescent cut. The eggs hatch in from three to seven days, and the little white grubs burrow into and feed upon the flesh around the stone for about a month.

Infested fruits, cherries excepted, usually fall to the ground before the grubs mature. When full grown (Fig. 252), the



FIG. 254.—A Cart Curculio-catcher in Operation.

white, footless grubs leave the fruits, burrow into the soil for three or four inches, where they form a little earthen cell, in which they soon change to white pupæ (Fig. 252). In from three to six weeks the pupæ transform to the curculios which emerge from the soil in July and August or later, and perhaps feed a little before seeking a place to pass the winter. There is thus but one brood of the insect in a year, although the curculios which "sting" or lay their eggs in the young fruits in the spring are developed and emerge from the soil during the latter part of the preceding summer.

The curculio travels by flying, but only during quite warm weather, or in the heat of the day. The insects mostly confine themselves to certain trees. But the fact that newly bearing and isolated orchards are soon attacked clearly shows that in occasional instances they must travel considerable distances. Indeed, they have been known to be wafted on the wind for a half-mile or more, the windward side of orchards being most infested immediately after strong winds from a thickly planted plum neighborhood.

Their flight appears to be never more than a few feet from the ground, and successful attempts have been made to shut them out of fruit gardens by means of a tight board fence, nine or ten feet high, entered by a tight gate.

The remedial measures suggested for the curculio are various. Those which merely repel without destroying the insect, and which are consequently inefficient, including such as spraying the young fruit with tobacco or lime-wash, or applying salt, offensive odors, etc. If practicable, avoid setting fruits liable to attack from this insect near woods, hedges, or other places where it can easily find such good shelter during the winter. As infested fruits, except cherries, often drop before the grubs mature, the gathering and destruction or feeding to stock of all fallen fruits daily will materially aid in reducing the numbers of the insect. It has been found that if swine are allowed to run in infested orchards, or where the trees are grown in poultry yards, good crops are often secured.

Several years ago it was discovered that the adult insects did considerable feeding both on the foliage and fruit of their food-plants. This led to extensive experiments in spraying with Paris green to kill the beetles, and the results were very encouraging, especially on cherry trees. Many fruit-growers now spray their trees two or three times, early in the season when the beetles are abroad, with Paris green or some similar poison at the rate of one pound in one hundred and sixty or two hundred gallons of Bordeaux mixture or water, and they are convinced of the effectiveness of the method so far as securing a profitable crop is concerned. Other extensive plum-growers claim that when the curculios are plentiful and there is not an abundant setting of fruits they have been unable to save the crop by spraying, and hence have discarded this

method altogether. Theoretically the poison spray should kill many of the curculios, for there can be no question about their feeding habits, as any one can soon convince himself by

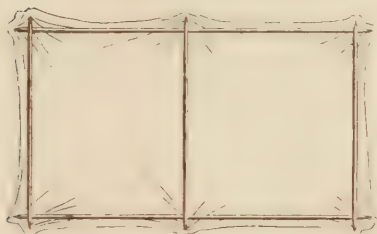


FIG. 255.—Thomas' Simple Curculio-catcher.

confining several in a box with fresh fruits or leaves.

Many who have been fighting this pest for years are satisfied that the *jarring method* is the only way to circumvent it. Apparently this method was first proposed by David Thomas, the father of the author of this volume. In

a communication to the *Genesee Farmer*, in 1832, he said: "Not three days ago I saw that many of the plums were punctured, and began to suspect that *shaking* the tree was not sufficient. Under a tree in a remote part of a fruit-garden, having spread the sheets, I therefore made the following experiment: On *shaking it well* I caught *five* curculios; on *jarring it with the hand* I caught *twelve* more; and on *striking the tree with a stone*, *eight* more dropped on the sheets. I was now convinced that I had been in an error; and calling in the necessary assistance, and using a hammer to jar the tree violently we caught in less than an hour more than two hundred and sixty of these insects."

Several contrivances have been proposed for spreading sheets under the trees on which to jar down curculios for the purpose of killing them. Thomas found nothing better, and none so cheap and quickly made, as the



FIG. 256.—Goff's Circular Frame for Curculio-catcher. (After Goff.)

contrivance represented in Fig. 255. In Fig. 256 is shown a modern circular frame which can be made by any one handy with carpenter's tools. It should be about ten feet in

diameter for large trees. Cover the whole frame with the sheeting, after which cut it open along one of the wood strips to the centre, where a small hole is cut to accommodate the trunk of the tree. The free edge of the cloth flap thus formed is then tacked to a light strip of wood of sufficient width so that it will cover the seam formed by cutting the cloth and rest by its own weight on the frame beyond.

In extensive Eastern orchards a wheelbarrow "curculio cart or catcher" (Fig. 254) is much used. It is not found necessary, as was formerly advised, to insert iron spikes into the trees or to leave short stumps of limbs on which to strike when jarring the trees. Long-handled mallets with the head well padded answer every purpose and do not noticeably injure the bark of the trees.

The best time for jarring is in the cool of the morning, when the insects are partly torpid with cold, and drop quickly. At mid-day they retain their hold more tenaciously, and more quickly escape. The work should be commenced very early in the season, as soon as the first fruit begins to set, or is not larger than a small pea. It may be necessary to continue the work every day for three or four weeks in some seasons. Usually the cost of jarring trees in this manner a season is from 10 to 20 cents per tree, which is a small amount to expend to ensure a crop worth many times as much. After being captured on the sheets, the curculios may be destroyed by throwing them into boiling water, into kerosene, or some burn them in small charcoal furnaces. A few minutes' work is often sufficient for many trees, and labor equal in the aggregate to that of a single entire day may save large and valuable crops.

The Plum Gouger (Coccotorus scutellaris).—In the northern portion of the Mississippi Valley this insect is often equally as destructive to plums as the plum-curculio, which it closely resembles. The female gouger deposits her eggs in the young fruit, making a round hole, but no crescent cut, and the grub feeds upon the kernel of the pit, in which it also transforms to the beetle. The rest of its life-story is much like that of the plum-curculio.

Poisonous sprays do not seem to check it, but otherwise it

is amenable to the same remedial measures as the plum curculio.

The Black Peach Aphis (*Aphis prunicola*) is a brownish-black plant-louse (Fig. 257) infesting the leaves, twigs, and roots of peach-trees. Trees less than three or four years old suffer most from its ravages. Thousands of such trees have been killed by it in Eastern peach-growing districts, and the pest has invaded Northern orchards.

Peach stocks should be carefully examined before setting, and if there are any indications of plant-lice on them, they should be dipped in a strong kerosene emulsion or whale-oil soap solution. It is a difficult matter to destroy the lice on the roots after the tree is set. Tobacco dust well worked in around the base of the trees has



FIG. 257.—The Black Peach Aphis, wingless form, much enlarged.

given relief in some cases. The lice which work on the tree above ground can be killed with a spray of kerosene emulsion diluted ten or twelve times or with a kerosene-water mixture containing 15 per cent. of kerosene.

The Peach-tree Borer (*Sanninoidea exitiosa*) "has killed more peach trees than all other causes combined," says J. H. Hale. It is an American insect and has been a serious menace to peach-growing for more than a hundred years. It sometimes also attacks plums, prunes, cherries, apricots, and nectarines, and has to be fought by nearly every peach-grower.

The borer is a white, grub-like caterpillar (Fig. 258 *c*), which feeds on the inner bark, forming a tunnel or burrow, usually on the trunk or large root below the surface of the soil. Infested peach trees are easily distinguished by the large mass of a gummy substance exuded from the wound and mixed with particles of bark and excrement. The adult insect is a beautiful, blue, wasp-like moth, the male (Fig. 258 *b*) differing remarkably from the female (Fig. 258 *a*).

In the latitude of New York the moths begin to appear in the latter part of June and continue to emerge until September. A few hours after emerging the females lay their small,

oval, brown eggs on the bark of the trunks of the trees from six to eighteen inches from the ground. From the egg there hatches in a week or ten days a minute larva—the young borer—which at once works its way into a crevice of the bark, and soon begins feeding on the inner layers of the bark. It continues to feed in this manner, gradually enlarging its burrow under the bark, until winter sets in, when it stops feeding and hibernates during the winter, either in its burrow or in a thin hibernaculum made over itself on the bark near the surface of the soil. The winter is always spent as a larva or borer, a few of them being nearly full-grown, but most of

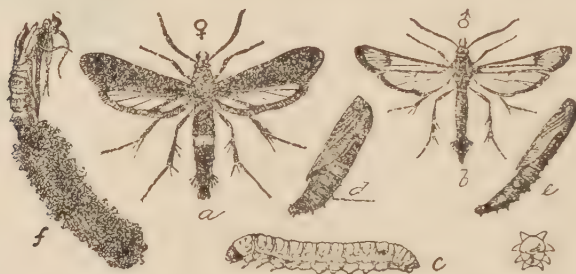


FIG. 258.—The Peach-Tree Borer. *a*, Female moth; *b*, male; *c*, full-grown larva; *d*, female pupa; *e*, male pupa; *f*, cocoon with pupa skin partially extended; all natural size. (U. S. Div. of Entomology.)

them being considerably less than one-half grown. In the spring, usually about May 1st in New York, they break their winter's fast and grow rapidly for a month or more, most of them getting their full growth in June. They then leave their burrows and spin about themselves a brown cocoon (Fig. 258 *f*) at the base of the tree, usually at the surface of the soil. A few days after its cocoon is made the borer changes to a pupa (Fig. 258 *d*, *e*), in which stage it remains for about three weeks, usually in June in New York. From the pupa the moth emerges, thus completing its life-cycle in a year, fully ten months of which are usually spent as a borer in the tree, the remainder or a little more than a month being spent in the egg, pupa, and adult stages. About the middle of July all stages of the insect may be found in some orchards. The above brief sketch of the life of the peach-tree borer will apply

in general to most localities in the United States north of Washington, D. C. In Canada the moths do not begin to fly until about a month later, while in the South they appear a month or more earlier, so that the dates in the above sketch will not apply to these regions.

The insect is open to successful attack only in its larva or borer stage, and in its pupa stage; the pupæ are reached only by searching for the cocoons and destroying them.

After four years of careful experimenting with most of the methods recommended to control this pest, we are led to the following conclusions:

The "digging out" method is the only thoroughly successful and safe way of killing the peach-tree borer. This method is expensive in time and labor, but our experience leads us to believe that any other equally as successful method will cost just as much. To make it a success the "digging out" should be thoroughly done, not

only on every tree in the orchard, but also on all "old relics" of peach-trees in the immediate neighborhood. A half-dozen such "old relics" left untreated near by will serve thoroughly to restock an orchard with borers every year, so that the "digging out" method, although practised each year, will never reduce the numbers of the borers below the danger limit.



FIG. 259.—Work of a Single Borer in a Peach-tree, natural size. *w b*, Burrow of borer; *g*, gummy mass; *p*, pupa projecting from cocoon.

This is a very important factor in the success of the "digging out" method. Dig out the borers in June or in June and September in northern peach-growing districts.

We kept out about two-thirds of the borers with tobacco stems wound around the tree just below the surface of the soil. The old "mounding" method evidently has considerable value as a preventive, and is, perhaps, the cheapest method yet devised. It is the most practicable method yet suggested for combating the insects in nurseries. Paper protectors, when carefully put on and kept intact during the danger period, will prove a valuable and very cheap preventive measure, especially when combined with the "digging out" method. Wooden boxes or wire cages did not prevent the entrance of the borer.

The favorite method of preventing the ravages of the peach-tree borer has been, for at least a century, by the use of a *wash* of some kind. More than fifty different washes have been concocted, most of which are valueless as preventives, and some of which will injure or kill the trees. Soap, lime, or clay proved useless ingredients of washes in New York's climate. Paris green did not add to the effectiveness of a wash, and is a dangerous ingredient to use on a tree. Carbolic acid or other odorous substances did not repel the insect.

Gas tar proved to be the best application we tested. We used it freely on the same trees for three successive years without the slightest injury to the trees, and it kept out nearly all the borers. Go slow with it, by first testing it on a few trees in your orchard, as trees have been killed with it. We believe it will prove equally effective whether the borers are dug out or not, and from no other application yet devised would we expect to get such results when used independent of the "digging out" method.

The following substances injured or killed our young trees, and are, therefore, classed as *dangerous*: Paris green and glue, raupenleim, dendrolene, white paint (with or without Paris green), and printer's ink.

The following is a list of the things we found to be practically *ineffectual* or *useless*: Wire-cages, carbon bisulphide, asafoetida and aloes, lime, salt and sulphur, resin wash, hard

soap, tallow, tansy plant, whale-oil soap, lime and linseed oil, hydraulic cement wash, pine tar, and one application of Hale's wash.

The following methods proved to be *quite effective*—that is,

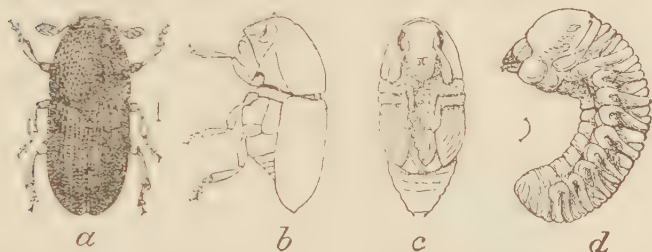


FIG. 260.—The Fruit-tree Bark-beetle. *a*, Beetle; *b*, same in profile; *c*, pupa; *d*, larva; all enlarged about ten times. (U. S. Div. of Entomology.)

most of them kept out over one-half of the borers: Hale's wash (two applications), mounding, tarred paper, tobacco stems, digging out, and gas tar.

In regions less moist than in Central New York it is possible that some of the methods, listed above as unsatisfactory, will prove good preventives against this serious pest. Washes should be applied about June 15th in Northern orchards, and must remain intact for over two months.

The Fruit-tree Bark-beetle or Shot-hole Borer (Scolytus rugulosus).—The bark of plum, peach, cherry, and apple-trees may appear thickly "peppered" with holes, as though by fine bird shot (Fig. 261). These are the entrance and exit holes of a small beetle (Fig. 260 *a*) whose grubs (Fig. 260 *d*) excavate narrow galleries in various directions under the bark, and often kill the tree or some of its branches. Usually only sickly or unthrifty trees are attacked by the insect.

It is a very difficult insect to combat. Badly infested trees should be burned at once. Keep the trees in good health and they will



FIG. 261.—Work of the Fruit-tree Bark-beetle in Twig of Apple, natural size. (U. S. Div. of Entomology.)

be less liable to attack. Deterrent washes have not been very successful; probably applications of kerosene-water, tar, or crude petroleum would be as helpful as anything.

The Cherry Aphis (*Myzus cerasi*) is a blackish plant-louse which often appears on the leaves of cherry-trees in immense numbers, causing the leaves to curl badly. It often checks the growth of the trees, and is sometimes a serious pest in nurseries. It winters over on the twigs as minute black eggs.

"Lady-bugs" and other enemies often aid materially in checking its injuries. It will succumb to the same remedial measures as the apple-aphis; it is important to spray early in the season before the leaves are so badly curled that one cannot readily hit the lice.

The Cherry Fruit-fly or Maggot (*Rhagoletis cingulata*) is a new fruit pest which has recently appeared in the cherry orchards of New York and neighboring States. It is closely allied to the apple maggot, and has a similar life-history. It has ruined from one-third to one-half of the crop in some orchards. It will prove a very difficult pest to control, for infested fruits do not drop from the tree, nor do they show any external evidences of their being inhabited by a maggot until they are overripe. Cherry-growers should be on the lookout for this new enemy. No successful remedial measure has yet been found.

The Quince Curculio (*Conotrachelus crataegi*), as its name indicates, is a near relative of the plum curculio. It is the cause of most "wormy" and "knotty" quinces, and often mars or nearly ruins much of the crop. The beetle resembles the plum curculio, except it is broader just back of the head, and has no humps in its back. It lays its egg in a pit in the flesh and makes no crescent slit, and it also differs much in its life-history, as it winters in the grub stage in the soil.

This quince pest can best be controlled by the jarring method, as described for the plum curculio. As quince trees are usually branched much lower than plum trees, it will be necessary to use lower "curculio-catchers" in collecting quince curculio.

The Grape Phylloxera (*Phylloxera vastatrix*) is a small plant-louse, one form of which works on the roots, causing excrescences on the smaller roots, and eventually killing suscepti-

ble varieties (Fig. 262); another form of the insect works on the leaves, forming irregularities on the under sides. The insect has always existed on American wild vines, yet it was not until it had been introduced in Europe, where it has wrought incalculable damage, that it attracted attention as a vine pest. It rarely does serious damage in this country, except in California, where European vines are grown.

"The use of American vines, either direct for the produc-



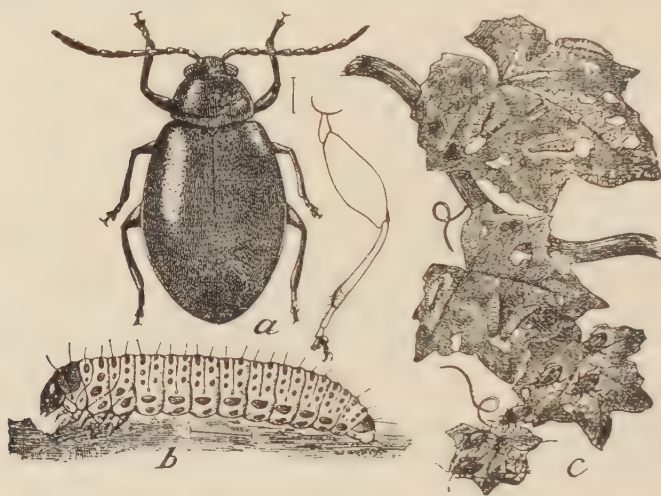
FIG. 262.—The Grape-vine *Phylloxera*. *a*, Root-galls; *b*, enlargement of same, showing disposition of lice; *c*, root-gall louse, much enlarged. (U. S. Div. of Entomology.)

tion of fruit or as stocks on which to graft susceptible European and American varieties, has practically supplanted all other measures against the insect in most of the infested vineyards of the world."

Grape-vine Flea-Beetle (*Haltica chalybea* (Fig. 263).—This is a small shining beetle about one-sixth of an inch long, usually of a steel-blue color, but often varying from green to purple. Many grape-growers have awakened some morning to find all of their prospective crop of grapes literally "nipped in the bud" by this pest. It has recently thus devastated hundreds of acres of vineyards in the great grape-growing regions of New York. Sometimes the insect apparently attacks a certain variety in preference to others, and it also works on the Virginia creeper.

After the beetles have satisfied their appetites, keen from

their long fast in hibernation, on the opening grape buds, they then lay their yellow eggs in the crevices around the buds. From these eggs hatch small brown grubs which eat irregular holes in the leaves (Fig. 265) in June. These grubs (Fig. 264) go into the ground and transform to the pretty blue beetles in about ten days. The beetles emerge and feed upon various plants during the rest of the season, but lay no eggs



FIGS. 263, 264.

FIG. 265.

The Grape-vine Flea-beetle.

FIG. 263.—Beetle. FIG. 264.—Larva. FIG. 265.—Beetles and larvæ at work on leaves, natural size. Figs. 263 and 264 much enlarged. (U. S. Div. of Entomology.)

for another brood of grubs until the next spring. They hibernate in any sheltered place around the vines.

This serious pest of the grape-growers can be easily controlled by the thorough use of a poison spray on the bursting buds in early spring; use Paris green at the rate of one pound in fifty to seventy-five gallons of water, to which two pounds of freshly slaked lime are added, and be sure not to let the beetles get the start of you in the spring. Or the beetles may be jarred from the buds into pans of kerosene, or on to sheets soaked in kerosene; the beetles quickly drop when the vine

is jarred. Follow up this treatment in the early part of June by spraying the infested portions of the vines with Paris green (one pound to one hundred and fifty gallons of water) to kill the grubs then feeding on the upper surfaces of the leaves; every grub killed then means one less beetle to hibernate and attack the buds the next spring; it is thus very important to kill these grubs in June.

The Rose-Chafer or "Rose-bug" (Macrodactylus subspinosus).— This beetle suddenly appears in great numbers in portions of the country, and in occasional years proves exceedingly destructive to the flowers and foliage of various plants, more particularly of the rose, apple, and grape.

It is an awkward, long-legged, light-brown beetle (Fig. 266) about a third of an inch in length. By the end of July the unwelcome hordes often disappear as suddenly as they came. The insect is particularly destructive in New Jersey, Delaware, and in sandy regions in New York and neighboring States. Its early stages are passed in grass or meadow land, usually where the soil is sandy. The grubs feed on the roots of grasses. The beetles lay their eggs in the ground in June and July, and the grubs get their growth by autumn, and transform to pupæ, and then to beetles the following spring.

It is a most difficult pest to control or kill, as they sometimes come in hordes of thousands. Substances applied to the vines to render them obnoxious to the beetles have proved of little value. The arsenicals usually will not kill them quickly enough or in sufficient numbers noticeably to reduce their ranks. When they come in swarms, the only hope is in collecting them in nets or in an inverted umbrella-shaped apparatus provided with a vessel of kerosene and water at the bottom to wet and kill the beetles. A few valuable vines or trees could be covered with netting to protect them. Their numbers may be considerably reduced, especially where they are a local pest over a limited area, by devoting their breeding grounds, usually a sandy locality



FIG. 266. — The Rose-Chafer, enlarged.

near by, to the growth of annual crops which require frequent cultivation.

The Grape-vine Leaf-hopper (Typhlocyba comae).—When grape leaves have a blotched appearance, or are covered with little yellowish or brownish patches, as at *f* in Fig. 267, and eventually dry up and fall, it is usually the work of little jumping insects, called leaf-hoppers (Fig. 267). They are minute insects about an eighth of an inch in length, and have a peculiar habit of running sidewise when disturbed, and dodging to the

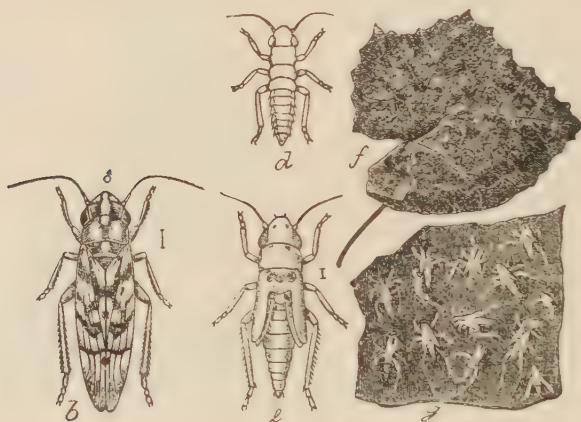


FIG. 267.—The Grape-vine Leaf-hopper. *b*, Adult; *d* and *e*, nymphs; *f*, work of insect on leaf; *g*, cast skins of nymphs on leaf; *b*, *d*, and *e*, much enlarged. (U. S. Div. of Entomology.)

other side of the leaf. The adults jump or fly away quickly when the vine is disturbed. Their wings and back are variously colored with red, yellow, and brown, while the body color is light yellowish-green. In May they begin to appear, and continue on the vines until the leaves fall. The adult hoppers spend the winter in masses of rubbish or leaves accumulated against fences or other obstruction, where thousands of them may be seen on warm winter days. The eggs are thrust under the skin of the lower side of the leaves of the vine in June. The nymphs (Fig. 267 *d* and *e*) live on the under sides of the leaves and suck out the substance of the leaf. As the nymphs grow they shed their skins four times,

and the empty skins often remain attached to the leaves in large numbers (Fig. 267 *g*). The nymphs run rapidly but do not jump like the adult hoppers. Apparently there is but one full brood annually in New York. All varieties of grapes are attacked, but the thin-leaved sorts suffer the most.

The adult hoppers are so active that it is difficult to hit them, and insecticides that will kill them damage the vine leaves. We have killed many adults in June by knocking them off and down to the ground with a 5-per-cent. kerosene-water spray and then quickly hitting them on the ground with a 25-per-cent. kerosene-water spray. Another practicable method is to catch them on sticky shields. Make a shield by stretching a cloth over a frame and treat it with tar or resin and castor oil ("tanglefoot"), then in the warm part of the day, when the insects are most active, carry the shield along near the vines and shake the vines. Thousands of them will fly or jump against the shield and be caught. Practise this every day or two until relief is gained. In July the nymphs or young hoppers quickly succumb to a spray of whale-oil soap (one pound in ten gallons of water), but it requires thorough and intelligent work to hit them on the under sides of the leaves.

Currant Borers often work considerable havoc by burrowing up and down the stems, usually killing them. There are two species of insects engaged in this nefarious work. One is the caterpillar of a moth allied to the peach-tree borer and known as the *Imported Currant Borer* (*Sesia tipuliformis*); the other species is the grub of a beetle known as the *American Currant Borer* (*Psococerus supernotatus*). The two kinds have similar habits, and remain in the stems over winter. It is thus an easy matter to stop their depredations by cutting out and burning all sickly or hollow stems either in the autumn or early spring.

The Imported Currant Worm (*Pteronus ribesii*) must be seriously considered when one attempts to grow currants or gooseberries in most parts of the country; it defoliates millions of these bushes every year.

The adult insect is a pretty little yellow-bodied saw-fly (Fig. 268) which emerges from its cocoon in the soil in the spring when the first few currant leaves have expanded, and at once

proceeds deftly to place its white eggs along the principal veins on the under sides of the leaves. The eggs soon hatch into twenty-legged larvæ or "worms" of a green color, with black heads and numerous black dots on the body (Fig. 270). They are about three-fourths of an inch long when full grown. When, as usually happens, they occur in large numbers, the leaves are rapidly consumed, and whole rows of bushes have been entirely stripped in forty-eight hours. Hence the importance of close watching and prompt attention in applying the remedies to destroy them. A single defoliation, while it does not kill the bushes, retards growth, and commonly greatly



FIG. 268.—Male.



FIG. 269.—Female.

Adults of Imported Currant Worm.

injures or prevents the ripening of a crop. When the larvæ attain full size, they burrow underground, or hide under scattered leaves, and spin an oval brown cocoon. After some weeks the perfect insect comes out and lays eggs, from which a second brood may appear in Southern localities. The winter is passed as larvæ in their cocoons in the soil beneath the bushes.

Fortunately this currant pest is easily destroyed by the application of poisons. White hellebore has been the standard remedy for many years. It is either dusted on to the bushes or a water mixture of it sprayed on. It is the only safe thing to use after the fruit is over half-grown. But extensive currant-growers now use a Paris-green spray (one pound to one hundred and fifty gallons of water) freely when the larvæ first appear, and often so effectually destroy the first brood that the insect is not a serious menace to the crop during the rest of the season.

The Native Currant Worm (*Gymnonychus appendiculatus*) is now rarely seen on cultivated currants or gooseberries; hence need not be discussed here.

The Currant Spanworm (*Eufitchia ribearia*) (Fig. 271), is occasionally destructive to currants and gooseberries in certain localities. It is a bright yellow looping caterpillar with black spots, that hatches in the spring from eggs laid on the twigs in the fall by a pale yellowish moth with several dusky spots on its wings. Hellebore or Paris green, used as recommended for the green currant worm, will destroy these spanworms.

The Raspberry-cane Borer (*Oberca bimaculata*) is sometimes a serious pest in raspberry and blackberry plantations. The adult insect is a slender dark-colored beetle, about one-half



FIG. 270.—Imported Currant Worm.—Larvæ.

an inch long, and with a yellow thorax. The beetles appear in June, and the female with her mandibles makes two rows of punctures, about an inch apart, around the growing cane near the tip. She then deposits an egg in the cane midway between the punctures which serve to girdle the cane and cause it to droop and wither. The little white grub soon hatches from the egg, and proceeds to tunnel its way down the pith of the cane. Recent observations indicate that the grub lives in the cane for two seasons, often extending its tunnel down to the ground, where it transforms through the pupa stage to the beetle.

This borer is easily controlled by cutting off when first noticed all canes with drooping tips several inches below where they are girdled; this will destroy the young grubs. Later, when harvesting the fruit, the infested canes can often be detected by their sickly appearance or the drying of the

leaves; all such canes should be cut off near the ground and burned.

The *Snowy Tree-Cricket* (*Ecanthus niveus*) sometimes seriously injures raspberry canes by depositing its eggs in longitudinal rows in the canes, forming a long ragged scar, as



FIG. 271.

FIG. 272

FIG. 271.—Currant Span Worm. FIG. 272.—The Snowy Tree-cricket. *a*, *b*, Stems of raspberry with eggs; *c*, *d*, egg, enlarged with details.

shown is Fig. 272. These eggs are laid in late summer or fall and do not hatch until the early part of the next summer. Except for the injury caused by the female in laying her eggs, this tree-cricket is not an injurious insect, but is said to feed upon plant-lice and other insects.

Canes containing these ragged slits full of eggs should be cut off and burned, especially in the fall and winter.

The *Raspberry Saw-fly* (*Monophadnoides rubi*) attacks the foliage of raspberries, blackberries, and dewberries, and often occurs in sufficient numbers nearly to ruin the crop. The

black-bodied, four-winged saw-fly emerges from its cocoon in the soil in May, and the female, with her saw-like ovipositor, inserts her eggs into the tissue of the under side of the leaf near the veins. The eggs hatch in from seven to ten days. Although the insect is closely allied to the common currant saw-fly, the larvæ differ remarkably in having their body profusely ornamented with spiny tubercles. When full grown in June, the larvæ of this raspberry saw-fly are about three-fourths of an inch long and are nearly the color of the raspberry leaf; the spines on the back are blackish and those on the sides pale green. They devour the whole leaf except the mid-rib and larger veins. During the latter part of June they enter the ground two or three inches and make an almost waterproof brown cocoon, in which they remain all winter, gradually changing through the pupa stage to the adult or saw-flies the next spring. There is thus but one brood of the larvæ each season.

The larvæ are easily jarred or shaken from the leaves, and some have reported success in controlling this pest on small areas by hiring boys and girls to jar off the little feeders by giving the canes light blows with a heavy, leafy switch, as a light pine branch with a bunch of needles at the end; the larvæ find it difficult to return to the bushes, especially if the ground between the rows be left well cultivated and crumbly, and if the jarring be done in the heat of the day.

An easier, cheaper and more effective method is to spray infested bushes with Paris green or some similar poison, using one pound in one hundred and fifty to two hundred gallons of water. One thorough application is sufficient to destroy most of the larvæ. After the fruit is more than half formed, use hellebore, either as a spray (one ounce to one gallon of water) or dusted on when the dew is on.

White Grubs (*Lachnosterna* sp.) (Fig. 273) are often a very serious menace to successful strawberry culture. They are the larvæ of the large brown beetles (Fig. 274), commonly known as May Beetles or "June-bugs." White grubs live upon the roots of plants, and their usual feeding grounds are grass lands. Hence, when strawberries are set on land which has been in sod for several years, it often follows that they are attacked by the grubs which had been living on the grass

roots. Affected plants present a peculiar wilted appearance, readily distinguished by the practised eye. The grubs feed during three seasons, finally transforming in the soil through the pupal stage (Fig. 275) to the May beetles early in the autumn; the beetles, however, remain in the soil and do not emerge until the next May or June. Most of the damage is done in strawberry beds by the nearly full-grown grubs.

The first precaution for the strawberry-grower to observe in trying to escape the ravages of white grubs is to avoid setting



FIG. 273.—The Grub.

FIG. 274.—Beetle.

FIG. 275.—Pupa.

The White Grub and its Parent, the May Beetle. (U. S. Div. of Entomology.)

his plants on old sod lands. If this must be done, then plough and thoroughly pulverize or cultivate such soil in the fall, thus disturbing and killing many grubs, pupæ, and recently-formed beetles. It will also pay to stir the soil frequently before and after setting the strawberries in the spring or summer, as thorough cultivation is a great discourager of white grubs.

Salt or similar applications to the soil around the plants rarely give relief. Experienced strawberry-growers can usually detect an infested plant, and they often practise the sure and not difficult method of digging out the culprit; the relieved plant often pays for the trouble later on.

The Strawberry Root-louse (Aphis forbesi) is a very small greenish-black plant-louse which attacks the roots of strawberries. In Maryland, New Jersey, and Delaware, it is said that hundreds of acres of vines have been rendered valueless by these lice. The insect also occurs westward through Ohio, Illinois, and into Wisconsin. It is a comparatively new pest,

but it usually becomes a serious one wherever it gets thoroughly established, especially in light soils. The wilting of the vines, as if for want of water, is said to be an indication of the presence of the insect on the roots. One should dig up and carefully examine the roots of such wilted plants. If the insect is found, the most stringent measures should be taken to prevent its spread.

It is said to be accompanied by ants, which may spread it from plant to plant. It is spread into new localities on the roots of the plants sent out by dealers.

Thus far, no one has succeeded in devising a practicable method of killing the lice on the plants after they are set. Some claim to have been successful with tobacco dust, but others have failed. Badly infested fields had better be plowed under at once and other crops grown there for a year or more. The only sure way to avoid the insect is to buy plants entirely free from it (doubtless plants which had been properly fumigated with hydrocyanic acid gas would be safe to use), and then set them on land where the louse has never existed.

The Strawberry-crown Borer (*Tyloderma fragariæ*) is one of the most destructive strawberry insects in the Mississippi Valley. The adult insect is a small brown snout-beetle allied to the plum curculio. It cannot fly, as its wings are rudimentary. The female lays her eggs on the crown of the plant in the spring, and the thick, footless, white grub which hatches therefrom excavates the crowns during the summer. In its subterranean cavity the grub transforms to a pupa, and finally, in August and September, to the beetle, which emerges from the crown, and, after feeding on the leaves, hibernates in the strawberry field. Old fields are especially liable to injury.

As the beetles cannot fly, it is desirable to isolate the new plantations from the old ones. If new plants must be taken from an infested field, use those which started after July and dig them early in the spring, to avoid carrying the eggs or larvæ of the insect with the plants. The plowing under of the infested field about July 1st will destroy the insect. The frequent rotation of other crops with the strawberry patch usually prevents the ravages of this crown borer.

The *Strawberry Leaf-roller* (*Phoxopterus comptana*) is in many localities the most injurious insect pest of the strawberry. A small greenish or brownish caterpillar folds the leaflets of the strawberry by bringing the upper surfaces together and fastening them by silken cords (Fig. 276). In this retreat the insect spends its whole larval life, feeding upon the leaf, and ultimately causing it to turn brown and shrivel up. The transformation through the brown pupa to the adult insect—a pretty little brown moth—takes place within the folded leaf. There are two annual broods of the pest in the



FIG. 276.—Strawberry Leaves Folded by the Strawberry Leaf-roller.

North, and at least three in Kentucky and southward. The winter is passed as a pupa in the rolled leaves.

Spraying with poisonous mixtures is impracticable while there is fruit on the plants, and experiments indicate that such applications are not very effectual at any time, so securely protected are the feeding-grounds of the caterpillars.

However, it is claimed that the pest can be almost exterminated in a field by mowing it after the crop is gathered, and after leaving it a day or two to become dry, burn it over, perhaps with the aid of a little straw or rubbish. This can usually be done without the slightest injury to the plants. This will destroy the leaf-roller as well as several other kinds of insects,

and also the spores of some serious fungous diseases. On small areas it is practicable to crush by hand the insects in the rolled leaves.

The *Strawberry Weevil* (*Anthonomus signatus*) is a little snout-beetle, measuring only a tenth of an inch in length (Fig. 277), which deposits an egg in a strawberry bud and then punctures or cuts the stem below it (Fig. 278) in such a way that in a few days the bud drops to the ground. Within the severed bud the grub hatched from the egg develops and transforms to a pupa, and soon to the beetle, which hibernates.



FIG. 277.—Strawberry Weevil.



FIG. 278.—a, b, Strawberry spray, showing work in bud and stem, natural size; d, larva; f, pupa; d, f, much enlarged. (U. S. Div. of Entomology.)

The beetles often feed upon the pollen and petals of the flowers, but the insect never attacks the fruit or foliage.

This pest is widely distributed throughout the Eastern United States; Maryland and Virginia strawberry-growers have suffered severely, half the crop in the former State being destroyed in 1896, it is estimated. The insect restricts its work to the staminate varieties and to the pistillates which furnish a considerable quantity of pollen. It also attacks the buds of the wild strawberry, the blackberry, and the red-bud tree.

This weevil is an extremely difficult pest to control. Poisonous and other sprays have not thus far given very encouraging results. It would be practicable to cover small areas or valuable plants with a muslin protector, put on about a week before the first blossoms appear. Grow as few staminate plants as practicable.

CHAPTER XIII.

THE DISEASES OF FRUITS.

FRUIT growing is frequently interfered with by various diseases. So serious have these become in many instances that considerable attention of late years has been paid to them by the United States government and the various Experiment Stations. It is the purpose in the following few pages to consider the leading diseases of those fruits that are described under their separate heads in subsequent pages of this book.

By way of introduction, it may be stated that these diseases are generally due to very small plants known as fungi that prey upon the substance of leaf, flower, stem, or root, and thus check the activity of the parts or destroy them altogether. These fungi are, perhaps, best known to the people generally in the conspicuous forms they assume as toadstools, puff-balls, and the various hard shelf-like outgrowths often seen upon the trunks of standing trees or fallen logs. Those forms that are charged with doing injury to crop plants are so small as to be entirely microscopic. The mould that comes upon bread when left too long in a moist, warm place is more like the destructive fungi of the orchard and fruit garden than the mushroom or toadstool. These fungi consist of very slender threads, which absorb nourishment from the substance they penetrate and reproduce their kind by means of minute bodies that are usually produced in great abundance. These spores bear the same relation to the fungus that seeds do to flowering plants; they are, in short, the offspring, and being microscopic, their distribution, chiefly through the moving air and flowing water, takes place unobserved by men.

These fungi are creatures of circumstance, and the spores do not germinate and grow unless there is the proper food at hand and moisture and warmth abound. It is during the moist warm days of August, for example, that the provisions

in the pantry quickly spoil, while those kept at a low temperature in the ice-box may be wholesome for a much longer time.

Fungi are divided into two groups as regards the nature of the substances upon which they thrive. Thus there are a great many sorts that live only upon dead organic matter, as in the case of the mould upon bread and cake, while others grow only upon substances that are alive. These are called parasites, and to this group the fungi producing the diseases of plants belong.

With this short general introduction the subject in hand will be entered upon, and it is hoped that with the aid of the pictures the text will be clear to all those who seek these pages for help in coping with one of the most serious of the groups of enemies to cultivated plants.

It is the purpose to consider each of the leading fruits, giving a brief description of the most prominent of its diseases, and follow immediately with any suggested remedies.

The Pomaceous Fruits.

THE APPLE: *Rust*. One of the leading enemies in the apple orchard is the Rust caused by a fungus with a long botanical name, which it is well to give here that any interested reader may thereby have a means of looking up this rust in other places. The rust of the leaves, stems, and even fruits of the apple, is due to *Gymnosporangium macropus* Lk. It is not our purpose to enter into a discussion of the literal meaning of these botanical names. It is usually from some microscopic characteristic; but however that may be, the botanical name of a fungus, like that of any other plant, is the same in all languages and lands, and removes the doubt and confusion that constantly arise when only the local name is used. In further justification for giving the botanical name of each fungus herein considered (when the species is described, and therefore known to science, it may be said that the apple rust in question is fully treated under its botanical name in the report of the chief of the Section of Vegetable Pathology for 1888, with a colored plate, showing its forms and structure.

The apple rust appears upon the foliage in oval patches con-

sisting of a few deep cups in which the spores are produced. In connection with this fungus there is an interesting life cycle, a knowledge of which is essential for the rational application of the necessary remedies. The common red cedar



FIG. 279.—Branch of Cedar with Gall, showing the soft horns that produce the spores in springtime. (From Galloway.)

is associated with the apple in the propagation of the rust fungus. In autumn small chocolate galls form upon the cedar branches, which may increase in size until an inch in diameter when mature in spring. When the moist days of April and May come, these galls have long, orange-yellow, gelatinous horns develop from them, and then the galls become conspicuous, resembling somewhat a small chrysanthemum bloom, and from this showy appearance they are often considered the flowers of the cedar (see Fig. 279). In the golden jelly spores are produced by the million, and as the horns dry down, the spores are carried away by the winds, and falling upon the young tender, unfolding apple leaves, soon grow and produce the rust spots above mentioned.

As the rust matures upon the apple, the spores are set free from it, and these, finding their way to the cedar trees in mid-summer, start a new crop of galls for the propagation of the rust upon the apple the following spring.

Remedies. It is seen from the nature of this fungus that, when it is destructive in the orchard, the cedar trees near by should be either cut away or the galls upon them picked off and destroyed before the spores are matured. It should be said that some varieties of apples are more susceptible than others, and the Russian sorts seem to be exempt. It goes without saying that orchardists should be upon the watch for this difference in susceptibility, and in regions where the rust is destructive be governed accordingly.

The Scab (*Fusicladium dendriticum* Fcl.) is perhaps the most common destructive enemy of the apple. The fungus attacks both the foliage and the fruit, producing upon the former brown patches, with the leaf somewhat distorted at the place of attack. The fruit is often attacked just as it is passing out of the flower stage, and may cause a dwarfing of the specimen, and giving it a blotched and misshapen appearance (see Fig. 280). Unlike the rust, the scab fungus is not a deep feeder; but growing close beneath the skin of leaf or fruit produces vast numbers of brown spores, thus giving the dirty discoloration to the affected parts. The spores are disseminated by winds and water and germinate quickly when the conditions are favorable, all of which is a full explanation of the rapid development of the scab at certain times.

Remedies. Several of the Experiment Stations have been making extensive tests of remedies for the apple scab, perhaps none more satisfactorily than the one at Geneva, New York. Three sprayings with the Bordeaux mixture are recommended: the first between the breaking of the bud and the opening of the blossom, followed by the second shortly after



FIG. 280.—An Apple, showing the blotches and distortions produced by the Apple Scab.

the petals have fallen, and the last about two weeks later. It is seen by this that the attack of the fungus, upon the fruit at least, is chiefly while it is young. Later on the skin becomes smooth and tough, and a foothold is not likely to be obtained.

The Bordeaux mixture now generally employed, after extensive experiments extending over several years, is as follows:

Copper sulphate (bluestone),	.	.	.	6 pounds
Quicklime,	.	.	.	4 "
Water,	.	.	.	60 gallons

Slake the lime with hot water and strain through coarse cloth or sacking. Place the copper sulphate in a bag of similar material and suspend it over night near the surface of a

tub or other wooden vessel filled with water. Hot water will greatly hasten the solution if it is desired. In preparing the full formula of sixty gallons, slowly pour a ten-gallon solution of the copper sulphate into twenty gallons of the lime wash, stirring thoroughly, after which the mixture is to be diluted to sixty gallons.

For the application a force pump of some durable kind attached to a tank and mounted upon wheels is necessary.

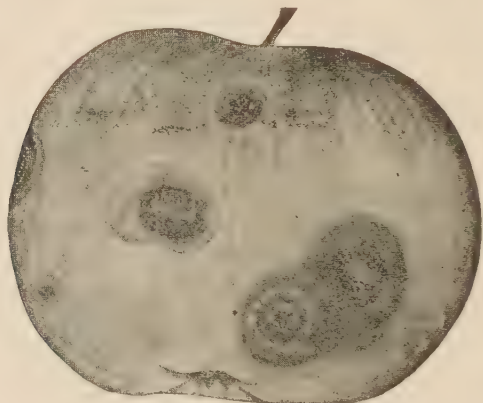


FIG. 281.—An Apple, showing the decayed spots of the Ripe Rot. (From Alwood.)

There are several reliable manufacturing firms paying special attention to spraying machinery, and bulletins upon the subject of fungicides and their application are published by the Experiment Stations, while information in abundance and proper form may be obtained of the general government through the Department of Agriculture at Washington.

The Ripe Rot (*Glomeris fructigena* Berk.), as the name suggests, is confined more particularly to the maturing fruit or after it is stored. The first suggestion of the disease is a circular spot upon the surface of the apple, slightly sunken and pale-brown colored. The diseased area increases rapidly, and soon the pimples containing the spores appear, often in concentric circles. When several rot spots appear at nearly the same time, they will shortly coalesce, and the fruit decays rapidly (see Fig. 281).

Remedies.—From the fact that the fungus comes late in the development of the apple and often grows most rapidly after the fruit is picked, it is evident that the early sprayings recommended in the case of the scab will be sufficient. The subject has been extensively studied at the Virginia Experiment Station and from the bulletins therefrom published it is clearly shown that the Bordeaux mixture is an effective remedy, but the sprayings need to extend through the season. It seems to be a fact that this fungus is much aided in its entrance into the fruit by an injury that may have happened to it. A worm hole may provide the open door, or the scab fungus furnishes a place for the lodgment of the spores upon an otherwise smooth impervious skin. In the same manner any bruising, especially if the surface is broken, will give an opportunity for the ripe rot germs to enter. It follows from this that early sprayings that keep off the scab and any insecticide to keep away destructive insects will indirectly have a good effect. It goes without saying that in the harvest care should be exercised that the fruit is gathered without any rough handling, and of course any specked fruit must be discarded, as the ripe rot propagates rapidly by contact.

The Black Rot (*Sphaeropsis malorum* Berk) is similar to the ripe rot in coming late in the development of the fruit, but is distinguished from the latter by the great difference in microscopic structure, by the dark color of the diseased flesh, and by the production of innumerable pimples of considerable size upon the surface of the affected parts in which the brown spores are borne.

Remedies.—There is nothing under this head to add to that given for ripe rot, with which this fungus is often closely associated. Sometimes a single tree or variety in an orchard will have the black rot much worse than others, and if it is an early variety it may furnish a source of infection; in such cases the rotten fruit should be gathered up and burned.

The Fire Blight (*Bacillus amylovorus* Burl.) is sometimes common upon the apple, causing the young twigs to die and the leaves to hang lifeless for the remainder of the season. This is much more vigorous and destructive upon the pear and will be treated later with the suggested remedies.

The Powdery Mildew (*Podosphaera oxycanthæ* D C.) is often

met with upon apples, but it is more destructive to the cherry, and will be considered with remedies under the latter fruit.

There are several other diseases of the apple, as, for example, some leaf-spot fungi, *Phyllosticta pomæ* Sacc., etc., that injure the foliage, but the sprayings recommended will suffice for them.

THE PEAR.—*Fire Blight* (*Bacillus amylovorus* Burl.). This old, widespread, and dreaded disease in the pear orchard is easily recognized by the brown dead leaves clinging to dying branches, giving the appearance of having been scorched by fire. Sometimes only a single branch or even a small twig is blighted, and in other cases the whole tree may have been destroyed, seemingly all at once or in a very short time. This is one of the bacterial diseases and the fungus is very different from any previously treated in this paper. Instead of long slender filaments, as with ordinary fungi like mildews and moulds, there are only exceedingly minute organisms that multiply with great rapidity in the substance of the pear tree. These germs winter over in the growing layer of the twig and may ooze out through a rift in the bark along with the juices of the stem. This exudation attracts insects; by means of these busy creatures the disease is carried to the opening buds of the pear, and particularly the blossoms. The nectar glands of the flower furnish a very acceptable food for these germs, and in it they thrive and multiply with astonishing rapidity, a single individual producing thousands in a few hours. From the blossom the disease is carried to other flowers and soon begins to spread down the twig from the point of inoculation, the tender tissue and rich juices of the shoot forming a suitable, well-protected place for the disease. As it works its way down the stem, the line of march is along the growing layer and protected from the outside world by the overlying covering of bark.

The amount of infection varies with the years and is somewhat dependent upon the weather. When, for example, there are a rainy May and June there is apt to be an excess of the blight. Fungi as a rule are favored by abundant moisture and the bacteria are no exception to this rule. After the germs are deeply seated in the older stems the amount of rainfall may not have so much influence as the temperature.

There are three points of attack, namely, the flowers, the opening leafbuds, and, thirdly, any exposed portion of tissue upon the main branches and stem, and as a result there are as many varieties of fire blight in common speech. However, the "flower blight," "twig blight," and "body blight" are all caused by the same organism and differ only in the place of invasion. The blight of the apple, previously mentioned, is chiefly of the blossom sort and rarely more than a few inches of the stem bearing the flowers with its leaves becomes killed by the germs. Occasionally all the blossoms are destroyed and the crop is lost, but as frequently the result is a natural thinning of the fruit before it forms and no great harm is done.

With the pear the blight is most at home, and here the whole tree may be invaded and destroyed. Some varieties are more susceptible than others, but some that were considered immune are now badly afflicted. In setting out new orchards the fruit-grower should consider among the most important things the liability of the variety to the fire blight.

In connection with this fatal disease there is not much to show in a picture; the blighted tree is unmistakable. The germs themselves are exceedingly small, and each organism is provided with whiplash-like motile organs, by means of which they are usually in motion.

Remedies.—Mr. Waite, of the Department of Agriculture, who has made a prolonged study of this subject, is of the opinion that the germs live over winter in the margins of blighted places, where the diseased cambium joins that which is healthy, and not in the dead twigs or the soil. While blighted twigs should be removed whenever seen, autumn is the best season to go over the orchard in a searching manner and remove all of the blight. The branches should be cut off a foot or more below the least sign of the blight or else it will hold over in the stump and the neighboring new shoots may be killed the next season. The greatest difficulty in removing the germs in a tree is when there is the so-called body blight, but in many instances this dies out of its own accord.

It is evident from the nature of the disease that spraying as for ordinary fungi will be of very little avail. If the inoculation is chiefly through the flower it comes at a time when

spraying is in itself injurious and is generally proscribed. Therefore but little remains but to use the knife judiciously.

It has been determined that the vigor and growth of the tree have their influence, and any highly nitrogenous manures that stimulate to an undue growth of succulent wood is conducive to blight. When it is remembered that the long withy water sprouts are the most certain to blight, it suggests that the feeding and culture should be such as to give a medium growth of strong healthy wood; in fact, the orchardist should strive for the development that is the most likely to bring the best crop of fruit.

The Leaf Blight (*Entomosporium maculatum* Lev.) is one of the most common and destructive of the diseases of the pear. It is recognized by the ashy spots upon the foliage and the premature falling of the leaves. Sometimes whole orchards will become bare of foliage in midsummer, and the half-grown fruit shrivels and becomes worthless. The pears are not exempt from the disease, the fungus causing at first blotches that may be purple or brown, followed by a cracking of the fruit and a failure to develop to useful size. The difference between the appearance of the blight upon the foliage and fruit would suggest unlike causes, but under the microscope the fungus is seen to be the same. This is a good illustration of the influence of the infested substance upon the appearance of the fungus, there being a much firmer tissue in the fruit than in the leaf and a consequent cracking of the former while the latter is sooner killed and turns to an ashy gray.

Remedies.—There have been many extended trials of fungicides for the Leaf Blight, and they all show that the disease can be controlled. At the Geneva, New York, Experiment Station the results have been favorable with Bordeaux mixture, the formula for which is given under the head of remedies for apple scab. (See Fig. 282, where the scab is shown upon the unsprayed fruit and the pears are nearly free when sprayed.)

The writer has had excellent results with Cupram, made according to the following formula:

Copper carbonate,	.	.	.	.	.	5 ounces
Strong ammonia,	.	.	.	.	.	3 quarts
Water,	.	.	.	.	.	50 gallons

This mixture is easily made by dissolving the copper compound in the ammonia and diluting with water to the required strength. With this mixture there is no lime to clog the sprayer and coat the fruit, the latter being a serious objection when Bordeaux is used after the pears are nearing maturity.

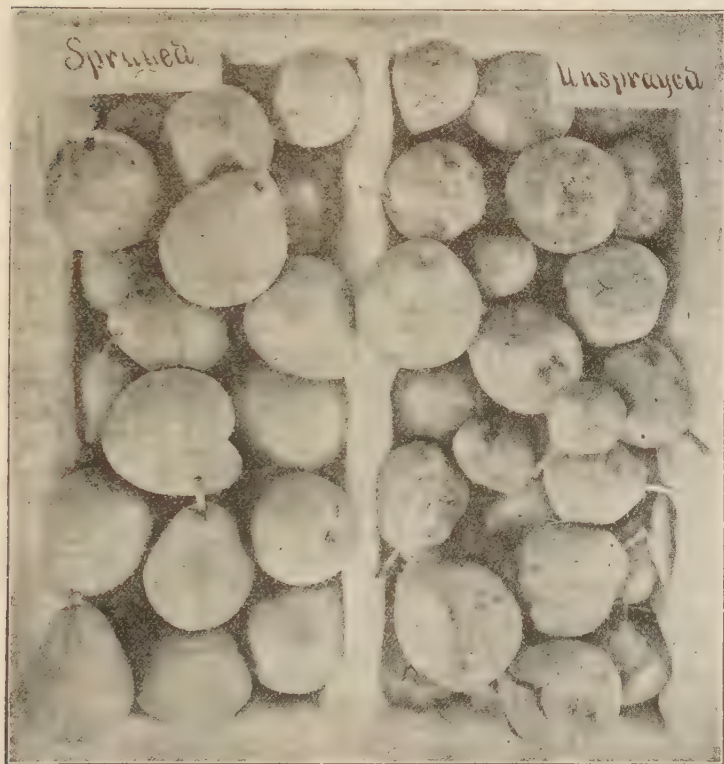


FIG. 282.—From a photograph of average fruit of sprayed and of unsprayed white Doyenne Pears. (From Beach.)

It is often the practice to use the Bordeaux for the first three sprayings, one before the flowers open and two at intervals of two weeks thereafter, and follow these with cupram.

Some varieties are much more inclined to the "fruit crack," as the disease is sometimes called. The Flemish beauty and

Clairgeau are among the most susceptible, but fine crops of fruit may be gathered of these sorts from trees that formerly were worthless after thorough spraying has been administered.

It only needs to be said in passing that the blight foliage and diseased fruit are sources of contagion, and the progressive pear grower will see to it these are burned so far as practicable and thus reduce the number of germs of the disease. There is an orchard sanitation as essential to good health of trees as that which should obtain around the house for the well-being of its inmates.

Pear Scab (*Fusicladium pirinum* Fcl.) is a very conspicuous fungus and one that is easily confused with the *Entomosporium*

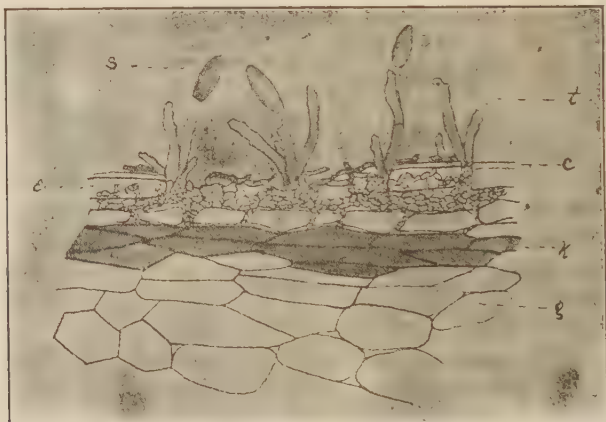


FIG. 283.—Microscopic view of a section through scab spot upon pear fruit showing spores at *s*, erect tips at *t*, cuticle at *c*, epidermis at *e*, and corky cells at *k*. (From Duggar.)

previously treated, but under the microscope the appearance is strikingly different. Instead of the compound spores of the *Entomosporium*, which curiously resemble the form and various body parts of an insect, and hence its generic name, the *Fusicladium* has simple oval brown spores that are produced singly upon the ends of short irregular threads (see Fig. 283). The fungus, by means of a network of fine threads, makes a firm attachment to the tissue of the fruit or leaf. The twigs

are likewise sometimes attacked, and by means of these the fungus is carried over the winter season.

Remedies.—In the first place let it be understood that the scab fungus may be in the twigs, and it follows that any dead stems and branches should be removed by pruning before the growing season opens. That the scab starts early is also well known, and fruits may be attacked before the blossom stage is past.

The sprayings with Bordeaux or cupram should begin early and be timed as for the leaf blight above mentioned. Some varieties are more susceptible than others, and in the setting of orchards the selection should be made with this in mind.

There are several other fungous diseases, as an anthracnose (*Colletotrichum* sp.), but they need the same treatment as mentioned above.

THE QUINCE.—*Rust* (*Gymnosporangium* sp.) of the quince is quite destructive in some places. It infests chiefly the stems

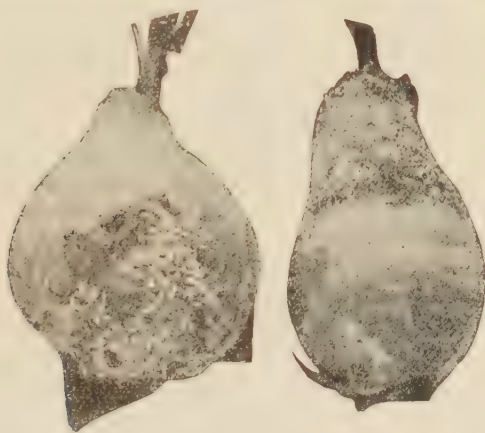


FIG. 284.—Two rusted young Quince fruits. The left-hand one is attacked at the blossom end and the other at the stem end. (From Bailey.)

and fruit, upon the latter producing contorted forms with an orange fringe-like coating (see Fig. 284). It is a close relative of the apple rust, and like it has its corresponding winter form also upon the cedar trees. Practically all that has been said regarding the life cycle of the apple rust applies with equal force.

Remedies.—It goes without further writing that the cedar trees need to be removed from quince trees that are suffering from the rust. As the quince twigs may become infested and it is possible that the rust will live over winter, then it becomes essential that the diseased stems are destroyed. In orchards where spraying has been carried out for other diseases it is observed that the rust is less abundant, and it therefore seems probable that with the Bordeaux mixture the rust may be held in check.

The Black Rot (*Sphæroopsis malorum* Pk.) is the same fungus as previously mentioned with the same name under apples and need not be considered further here. It is quite apt to begin its destructive work at the blossom end of the fruit and furnishes a good illustration of this place as being a favorite one of attack.

The Fire Blight (*Bacillus amylovorus* Burl) is frequently met with upon the quince, and is demonstrated as being the same in nature as that of the pear, under which head it has been considered, with remedies. The disease as a rule is confined to the upper parts of the twigs and rarely descends to the larger stems.

The Leaf Spot (*Entomosporium maculatum* Lev.) is another quince enemy that is more frequently met upon the pear and has been considered under the latter. It is interesting to note in passing that plants when closely related are apt to have the same diseases.

The same thing will be observed under the next groups, namely, the stone fruits, when a list of enemies is met with quite different from those thus far considered.

The Ripe Rot (*Gloeosporium fructigenum* Berk.) is the same as that upon the apple, and requires the same precautionary measures. It is not unusual for an old neglected quince bush to be the source of infection for diseases of both the apple and pear trees that are grown with good care near by. There are various leaf blights of the quince which will need the Bordeaux mixture or cupram for holding them in check.

THE STONE FRUITS.

THE PEACH.—*Yellows.*—There is no disease that is more disastrous than the Yellows, which in general is recognized

by the premature ripening of the fruit which, enlarging to more than the normal size, takes on an unnatural spotting of purplish and red, with the flesh streaked with pink. The fruit when apparently mature is bitter in taste and worthless. This "forcing," as it is sometimes called, may be confined to a



FIG. 285.—A four-year-old Peach-tree, with yellows showing as "brooms" or "pennyroyal sprouts" upon the main branches. (From Smith.)

few fruits upon the tree or a single branch; but when at its worst the whole crop is highly colored, full-sized, and soft some weeks before the natural time for maturing.

The trees show the disease even before they come into bearing, and of course in years when there is no fruit other characteristics than the prematuring need to be considered. The yellows is recognized in the tree itself by the presence of small shoots that spring from the main branches and bear long, nar

row leaves, often of a yellowish color, the latter fact giving rise to the common name by which this trouble is known throughout the United States. The tufts of fine-leaved branches are sometimes spoken of as "brooms," or "penny-royal sprouts," and trees that show these are victims to the disease (see Fig. 285). The yellows is a very contagious affliction of the peach and will spread rapidly through an orchard.

Professor Smith, of the U. S. Department of Agriculture, has made a prolonged study of the yellows, and concludes that it is quite general over a wide range, first becoming prominent in the peach belt of Michigan, where it threatened the leading industry in that section. It is now thought that the yellows is closely related to the phenomenon of variegation, which may be due to an oxydizing enzyme; that is, a substance not associated directly with any fungus or micro-organism, but capable of inducing a sort of ferment of some chemical change, the result of which is the destruction of the green of the foliage and rendering the parts unhealthy. It is possible that this ferment may be present to a limited amount in all peach trees and only increases to a destructive extent when certain conditions obtain. That it is contagious is abundantly demonstrated by the scientific expert who has transmitted it by budding, and this agrees with the practical working of the disease in the orchard.

There is a disease somewhat similar to the above, called Peach Rosette, that threatens destruction in some localities.

Remedies.—As yet under this head nothing can be recommended in the way of sprays. The contagion may come into the orchard in the trees from the nursery, and therefore great care needs to be taken in the purchase of healthy stock. The grower should be able to recognize the disease in its incipient stages and take heroic measures to remove it from the orchard. In many States laws have been enacted for the protection of orchards from this dire pest, and in some localities trees of all ages and by the thousands have been uprooted and burned until at present in such regions the yellows has been checked and peach-growing is restored to its former importance.

There are many yellow peach trees that are so from lack of congenial soil, situation, and adequate food supply. Manure

and fertilizers do much toward removing the "starvation yellows"; but such is not contagious. It goes without saying that profitable peach growing is a high art that only the careful student of the subject is able to understand. When the genuine yellows is suspected, appeal should be made at once to all the many sources of information upon the subject, and even then the orchard may need to be destroyed for the sake of future crops of peaches there and elsewhere in the neighborhood.

The Leaf Curl (*Exoascus deformans* Fcl.) is perhaps the most conspicuous of the well-established fungous diseases of



FIG. 286.—Branch of Peach, showing the Leaf Curl.

the peach. The presence of this enemy is quickly recognized by the distortions it causes in the foliage, some of the leaves becoming highly colored, yellow and red (see Fig. 286). The curl usually comes with the first leaves if it comes at all, and in the worst cases all the foliage is affected and largely falls away, as later leaves unfold. The fungus hibernates in the

buds and young twigs, and its development evidently depends largely upon the conditions of the weather during winter or spring, or both. It has been observed that a wet May is particularly favorable for the development of the leaf curl, while in other years, when the spring months are comparatively dry, the disease is almost absent.

Remedies.—Spraying of the peach trees in winter with the Bordeaux mixture has often had a remarkably good effect, as it prevented the disease from destroying the foliage and blasting the flowers. At other times the early spraying of the trees has had very little effect. It should be borne in mind that no other tree is so tender as the peach, and its foliage is quickly burned by a mixture that is harmless to the apple or pear. A half-strength solution of Bordeaux is recommended for the peach.

The Fruit Rot (*Monilia fructigena* Pers.) is the disease that carries off a large fraction of the peaches, especially in a season with much wet weather at the time of maturing the fruit. The *Monilia* is sometimes called gray mould, because it covers the affected fruit with a gray layer with the feel of powdered soap-stone. The fungus, after destroying the fruit, will spread to the less congenial stems, sometimes causing them to die. These twigs furnish a place for the wintering of the mould, as also do the fruits which dry down and frequently adhere as mummies to the stems or fall to the ground and harbor the fungus there.

Remedies.—From the fact that the *Monilia* is a very rapid grower in the soft pulp of a maturing peach and favored greatly by moist weather, it follows that spraying has not always given the most satisfactory results. In the first place, as a preventive measure, all mummy fruits should be destroyed during the winter season, along with any twigs that are dead or affected with the mould. At the same time the trees may well be sprayed with Bordeaux to cleanse them of thousands of adhering spores. Some good results have been obtained from the spraying of the trees at the time when the trees are in bearing, but this should be with cupram or other clear mixture, bearing in mind that the peach in leaf is a very tender subject.

The Scab (*Cladosporium carpophilum* Thum.) appears as dark

spots upon the fruit, usually the upper side being the most affected, which is often dwarfed, and the flesh may crack and expose the inner substance to the inroads of the gray mould previously mentioned (see Fig. 287.) The growth of the scab fungus seems to depend largely upon the conditions which obtain upon the upper side of the fruit, whether this be the greater heat upon the sun-exposed side, or the fact that the spores are more apt to find lodgment there than elsewhere. This scab is similar in its results to that of the apple and pear, but not the same as either of them, and therefore no spreading of the disease may be expected from the pomaceous fruits to the stone fruits. This fungus, when upon the foliage, produces spots of dead tissue which, falling out, leave round vacant places, sometimes called "shot holes." The same appearance is often caused by *Cercospora persica* Sacc.



FIG. 287.—A half-grown Peach, showing the Scab upon one side with cracks in the fruit. (From Smith.)

Remedies.—It has often been observed that overladen trees are more affected than those with only a proper amount of fruit, and this suggests that one of the best methods of holding the scab in check is by judicious thinning, which should be done as soon as the time for the natural dropping ("June drop") is past. It is likewise true that the best way to thin the fruit is by using the pruning shears early in the season. The young peaches, when attacked by the scab, are so thickly coated with fuzz that it almost prohibits any close contact of a liquid fungicide with the fruit. Sulphur dusted through the trees has been recommended, but the satisfactory method of dealing with the scab is yet to seek.

THE APRICOT.—*Rust* (*Puccinia pruni* Pers.) of the apricot is very destructive to the orchards in California. It attacks almost all the drupaceous fruits from prune to almond, but it is only in the warmer portions of the United States that it is a serious pest.

Remedies—This is one of the few genuine rusts that have

been satisfactorily held in check by spraying with fungicides. The orchardists upon our western coast may well seek the information available for them in the U. S. Department of Agriculture.

THE PLUM.—*Black Knot* (*Plowrightia morbosa* Sacc.) is the most conspicuous fungous enemy of the plum. The attack is made upon the young twigs in the spring, which soon begin to swell, the bark cracks, and upon the surface of the fissure the fungus produces an olive coating of spores by means of which the disease is spread. This is one of the very deeply-seated fungi, its threads being located chiefly in the growing layer beneath the bark, and when the final spores are produced they are located in sacs embedded in a hard black crust of the distorted branch, from which the common name is naturally derived (see Fig. 288).

The black-knot fungus attacks a number of kinds of wild plum and cherry trees. It is not infrequent that the hedge row surrounding an afflicted orchard contains many wild shrubs and trees conspicuous, especially during the winter, for the many black excrescences upon their branches.

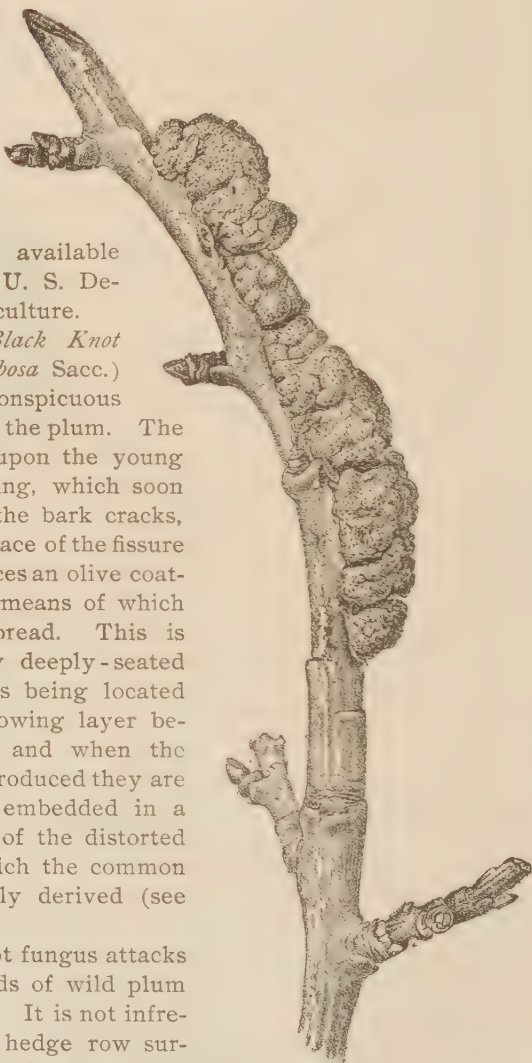


FIG. 288.—A portion of a Plum Branch with the Black Knot in mature form. (From Farlow.)

Remedies.—Owing to the fact that the fungus lives from year to year in the growing layer of the branch, it is evident that when once a tree is infested, ordinary spraying is not effective as a cure. The only successful method of treatment thus far determined is the knife and saw, by which the diseased parts are removed, care being taken to cut several inches below any signs of the knot, or otherwise a new excrescence will form upon the stump. The spores are abundant in such knots, and they need to be burned, for if thrown into a brush heap the germs will escape as well from there as when upon the tree. All similar knots upon wild plants should be treated in the same way, and this is not the only case where the fruit grower needs to go beyond the garden fence to stay an enemy lurking close at hand.

Experiments have been made with some success in checking the fungus by using fungicides. Spraying at a time when the trees are most susceptible in early spring, and the painting of the knots with a destructive liquid, have given some encouragement; but the only reliable method thus far suggested is that of cutting away the diseased parts as soon as they are found by careful search.

Plum Pockets (*Exoascus pruni* Fcl.) are well named abnormal fruits that become many times their natural size and usually very spongy and often hollow (see Fig. 289). The same fungus attacks the twigs sometimes so extensively as to destroy all the young branches. These affected tips become like the young fruits above noticed, and dying give the tree an appearance similar to that caused by the fire blight upon the apple. The "pockets" are often abundant during moist or wet springs, and some varieties seem more susceptible than others.

Remedies.—Experimental tests for the control of this fungus have not been extensive, and while spraying may prove successful it can only be suggested for trial. The fungus is of the same class as that causing the black knot, and like it may require the heroic method of severe pruning. As the *Exoascus* attacks the young portions, the removal of the parts is an easier matter than with the black knot, especially if the latter has been upon the tree for some years.

The Leaf Blight (*Cylindrosporium Padi* Karst) produces brown



FIG. 289.—Portion of Plum branch, showing both the normal fruit and the enlarged "pockets" due to the *Exoascus Pruni* Fcl. (From Galloway.)

patches upon the leaves and causes the premature falling of the foliage. In general appearance the work of this fungus resembles that of the leaf blight of the pear.

Remedies.—Fairly good results have been obtained by the use of fungicides, and plum growers who suffer from a defoliation of their orchards should see to it that sprayings are resorted to, beginning early in the season.

The Scab (*Cladosporium carpophilum* Thum.) is the same as that upon the peach treated above, to which the reader is referred.

The Fruit Rot (*Monilia fructigena* Pers.) is also the same as that of the peach, and is another illustration of a common enemy to plants that are closely related.

THE CHERRY.—*Black Knot* (*Plowrightia morbosa* Sacc.) of the cherry is the same as that of the plum, and the peculiarities of the species and method of treatment need not be again given here.

The Leaf Blight (*Cylindrosporium Padi* Karst.) is the same enemy as mentioned above for the plum. This "shot hole" fungus is very common upon cherry foliage.

The Fruit Rot (*Monilia fructigena* Pers.) is a common fungus of the stone fruits generally and one that has been considered under the diseases of the peach. It is perhaps most rapid in its development upon the cherry, because of the thinner skin and softer pulp of the latter fruit than that of the peach, and this may account for the unusual rapidity with which it will work ruin to a maturing crop of cherries when the days are rainy.

The Mildew (*Podosphera oxycanthæ* D C.) is frequently met with upon the peach, plum, and cherry, and is mentioned because most destructive to the latter plants. It works particularly upon the young stems and their leaves and causes the latter to become coated over with the fungus when they coil up and are comparatively worthless.

Remedies.—This is a superficial fungus, and like many others of its class is easily controlled when spraying is resorted to. It is particularly destructive to nursery stock, and a few applications of Bordeaux sometimes make all the difference between a good healthy growth and a stunted plant.

THE VINE FRUITS.

THE GRAPE.—*Black Rot* (*Leotardia Bidwellii* Ell.) of the grape is a fungus that attacks both the leaves and the fruit and occasionally is met with upon the young canes, producing there dark sunken spots. Upon the foliage the disease assumes the form of reddish-brown, oval blotches situated between the veins, and greatly interferes with the activity of the leaves. The greatest injury is done to the fruit, which becomes discolored, then turns black, shrivels upon the stem, and is covered with the spore-bearing pimples similar to those upon the dead areas of the leaf (see Fig. 290). The fungus remains alive over the winter in the mummy fruits, the dead fallen leaves, and the injured canes.

Remedies.—The ordinary pruning and burning will dispose of the greater portion of the disease present upon the canes and berries that may remain attached. It is well to rake up and burn the leaves and any fallen fruit in any vineyards where the rot has been injurious. Some growers of grapes take the further precaution of removing the clusters while they are still green when the rot has ruined them. During

the winter the vines and trellises may well be treated with a wash of copper sulphate, one pound to thirty gallons of water. This use of the plain bluestone solution is of special value as a

cleansing solution, and can be safely employed upon stems not leaf-bearing at the time.

Last, but not least, is the use of Bordeaux upon the vines during the growing season, with cupram as the fruit nears maturity. In this way there is usually ample opportunity for the removal of the lime in the Bordeaux by natural causes and the fruit will be acceptable in the markets. Should the Bordeaux only be used it can be removed from the fruit by dipping in a very weak solution of vinegar. The bagging of the clusters while quite small will prevent the access of the germs and help to save the fruit, and protect them as well from the loss of the delicate bloom that adds to their attractiveness.



FIG. 290.—A Cluster of Grapes ruined by the Black Rot. (From Galloway.)

The Anthracnose (*Sphaceloma ampilinum* DeBy.) causes a serious disease of the grape, easily distinguished from the black rot by producing sunken spots and lines upon the new growth of canes developing a purplish border and a gray centre. The fruit spots are usually circular, and with the deep depression and reddish border they somewhat resemble bird's eyes. Similar spots and patches are often found upon the main veins of the leaves.

Remedies.—The distribution of this fungus is similar to that of the black rot, and the same precautionary measures there given hold good with the anthracnose, which is, however, not so easily controlled by spraying as the black rot.

and the burning of the diseased parts is all the more important.

The Downy Mildew (*Plasmopara viticola* B. & C.) is a fungus quite different in appearance from any thus far considered. As its name suggests it produces a downy coating upon the affected part, usually the under side, with a yellow discoloration of the upper side of the leaf. The affected fruits while half grown turn brown prematurely, and for this reason the term "brown rot" is sometimes given to this disease. The browned berries remain hard and never become edible and rarely show the fungus upon the surface. Sometimes the canes are infested, when they are coated with the downiness common to the leaves. The filaments of the fungus come to the surface through the stomates and then they branch and subdivide, producing the spores upon the tips (see Fig. 291).



FIG. 291 - Shows threads of Grape Mildew arising through "breathing pore" of leaf, afterward branching and bearing spores upon their tips. (From Scribner.)

Remedies.—The same treatment is recommended here as for the diseases of the grape already considered. As all these troubles may be upon the same vine, or even single leaf, it follows that the remedy applied for one will answer for all.

The Powdery Mildew (*Uncinula necator* Schw.) is another fungus of the vine that while the leading enemy in Europe is of secondary consideration here. This is a superficial mildew—that is, it grows upon the leaf and does not penetrate the tissue, and on this account may be easily controlled as by sulphur dusted over the vines. The sprayings recommended for the other vine diseases will be sufficient for this one.

The Ripe Rot (*Glæosporium fructigenum* Berk.), previously mentioned under apple, is a common trouble with the maturing grapes. It need not be further considered here, except to note that in this instance widely different plants are affected with the same fungus. It should, however, be kept in mind that this is a disease of a substance—namely, the flesh of a maturing fruit—that is more of the nature of a lifeless tissue and has lost its specific vital qualities. In the same way the common bread mould will thrive upon mature sweet potatoes and turnips, while the living leaves and stems of the same plants are not attacked by it.

THE BUSH FRUITS.

THE BLACKBERRY.—*Rust* (*Puccinia Peckiana* Howe) is the leading fungus of the blackberry and is quickly recognized by the more upright dwarfed canes with multitudes of blisters upon the leaves which upon rupturing expose orange colored spores that give an appearance of iron rust to the affected parts. The disease threads extend all through the plants, and when the rusted cane is cut down to the ground it is soon followed by a new growth that shortly shows the rust throughout. The same disease is frequently found upon the wild brambles, and it is also observed that some of the cultivated varieties are more susceptible than others.

Remedies.—From the deeply seated nature of the disease it is evident that spraying will not effect a cure. Like the black knot the knife and burn heap need to be resorted to when plants are badly diseased, and should be removed root and all. It would be folly to attempt successful blackberry culture in places where the wild brambles are badly rusted until these have been destroyed. The grower needs to be assured that the waste land is not a place for the propagation of a fungus that may destroy the garden plants.

The Anthracnose (*Glæosporium venetum* Speg.) is similar to the one upon the grape and like it is found upon leaves and canes, forming oval patches with gray centres and purple borders.

Remedies.—The winter treatment of the canes with a solution of copper sulphate as mentioned under grape is recommended. The experiments made in spraying the plants dur-

ing the growing season have not shown that this anthracnose is easily checked; but further tests need to be made before a conclusion in the matter is reached.

THE RASPBERRY.—The chief diseases here are the rust and anthracnose mentioned already under blackberry, with which the raspberry is very closely related. There are some leaf-spot fungi also common to these two species of brambles.

THE CURRANT.—*Cane Blight* (*Nectria cinnabarina* Fr.) is one of the newer diseases, but is becoming quite abundant in some localities. This affects the whole cane, causing it to die sometimes when bearing fruit of nearly full size. Along with the shriveling of the berries and fall of the leaves the diseased canes show numerous bright pink pimples (see Fig. 292). This disease is related to the black knot of plum and cherry, and like it has taken a firm grip upon its victim before its presence is observed.

Remedies.—The whole plant should be removed and burned as soon as the blasted canes are found. Spraying is too slow a treatment, even if it were effective, with a disease so contagious as this upon plants that are small and easily rooted out and the ground occupied with some other crop.

The Anthracnose (*Gleosporium ribis* M. & D.) causes minute dark spots upon the leaves, followed by yellowing and their dropping from the canes. When very severe, the green fruit is left to shrivel upon the defoliated branches, but usually the fall of the leaves is shortly after the crop is harvested.

Remedies.—This fungus is closely related to other anthracnoses previously considered and may be controlled by the use of the standard fungicides.

The Leaf Spot (*Septoria ribis* Desm.) is a fungus that produces effects similar to those of the anthracnose, while its microscopic structure is quite different.

Remedies.—Spraying should be thorough and begin early in the season. The currant is well adapted in size for the application of fungicides, and any adhering lime upon the smooth fruit is easily removed. To avoid this coating a clear mixture may be used instead of one containing lime.

THE GOOSEBERRY.—The diseases of the currant are practically the same as those of the gooseberry, and all that has been remarked above regarding them generally applies here.

The Mildew (*Sphaerotheca mors-uvæ* Schw.) is a fungus that is very destructive to the gooseberry, but is rarely met with upon the currant. The European varieties are particularly

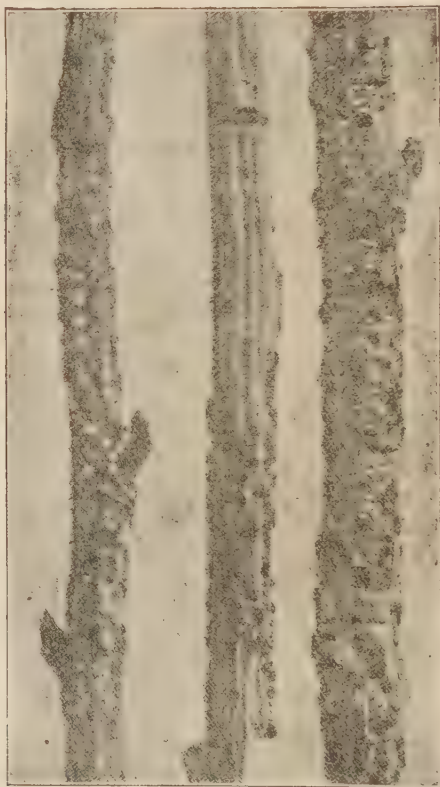


FIG. 292.—Currant Canes, showing the Blight as projections from the surface (From Durand.)

susceptible and usually are considered not worthy of cultivation because of the prevalence of this disease. This mildew produces a felt-like brown coating upon the young growth of stems, including the leaves and fruit, which are much dwarfed and distorted. The fungus is entirely superficial and consists of filaments lying upon the surface with upright branches that

bear the spores. There is a second form of spore produced in spherical thick-walled bodies, designed for preserving the mildew through the winter. These form later in the season than the small naked spores previously mentioned.

Remedies.—Satisfactory results are obtained from spraying the gooseberry plants, partly because the mildew is upon the surface only. With a similar fungus upon greenhouse roses flowers of sulphur has long been in use, dusted upon the plants



FIG. 293.—A Leaf of the Strawberry showing the Spot. (From Bailey.)

or placed upon the heating pipes where it gives off fumes. At some Experiment Stations sulphide of potassium has been found effective against the gooseberry mildew, the formula being one ounce to a gallon of water. This is a solution easily made and applied and is a comparatively clear liquid. Good results follow the use of Bordeaux, but this of course tends to coat the fruit.

THE GROUND FRUITS.

THE STRAWBERRY.—*Leaf Spot* (*Sphaarella fragariae* Tul.) is the most conspicuous and common of the fungous enemies of the strawberry. This causes purple spots upon the leaves, the

centres becoming ashy gray (see Fig. 293). The fungus also attacks the fruit-stalks, cutting off the supply of nourishment and thereby injuring the crop. During winter the fungus remains in the affected parts, particularly the old leaves.

Remedies.—Many remedies have been used upon the strawberry, some of them with indifferent results, probably because of the difficulty of reaching the under surface of the foliage. Bordeaux, however, is recommended, and cupram at times when the fruit might be defaced with the lime of the former mixture. Some growers with scythe and rake remove the blighted leaves in the autumn and burn them, while others have employed a weak solution of sulphuric acid as a spray, and thus destroy the foliage, letting the new spring growth supply the fresh healthy leaves for the production of the coming crop.

There are other fungous diseases of the strawberry, but they are indistinguishable from the leaf-spot except by close inspection.

THE CRANBERRY.—*Scald.*—There are several fungous diseases of the cranberry, but as this crop demands peculiar conditions, is limited to few localities, and does not admit of the ordinary methods of treatment, only a word need be said. The Scald, or Rot, as it is sometimes called, attacks the fruit and other parts of the plant, causing upon the former a softening of the fruit, usually first upon the sun-exposed side.

Remedies.—All attempts to check the Scald by the use of fungicides have failed. The fact that the land is under water for much of the time, and a bog at best in the dry period of the year, renders it difficult to apply fungicides satisfactorily. Besides, the cranberry bogs are often large low-priced areas, with many weeds, and the industry is extensive instead of intensive, making spraying unprofitable no matter how effective the applications might be.

ROOT GALLS.—As a last word, and going to the root of the subject, it may be said that of late years much complaint has been made of galls upon the roots of various orchard plants, especially the peach. The subject has been studied by Prof. J. W. Toumey, of the University of Arizona Agricultural Experiment Station, with the result that the disease has been found to be caused by a species of slime-mould living in the

tissues of the root and causing the development of the galls. Careful experiments were made which showed that the disease was easily communicable, thus demonstrating the great necessity of avoiding its introduction into the nursery or orchard, especially since no very effective remedy for it was found. It seems wise, therefore, for all growers to reject all peach, plum, apple, or other plants whose roots are in any degree malformed. The fact that the trouble is underground adds much to the difficulty of checking it, and therefore all diseased roots should be excluded at the time the trees are set.

In conclusion, it is remarked that only the leading sorts of fungi have been considered, but enough, it is hoped, is presented so that the fruit grower will find some clew to any disease that is serious. It may be said, as a final word, that there are several experts at work upon fungous diseases, and further information upon the subjects, herein considered, may be obtained of the division of Physiology and Vegetable Pathology, U. S. Department of Agriculture, Washington, D. C., or through the Experiment Stations of the various States.

The fruit-grower should not hesitate to make complaint and call for information through the avenues created by the Government for the special help of the crop-growers of this country. It may be that an old and well-known enemy has made its first appearance in a community, and methods for its treatment are well worked out. Should it be a new disease, or of recent importation from some other country, it then becomes of special interest to the expert as it is to the plaintiff, and it is an advantage to all that the call is made for help. In this age of the world, all obstacles to successful fruit-growing as far as possible should be removed. It is argued that the person who is sufficiently wide awake to observe fungous troubles as they arrive and strive to remove them at the outset will not fail because of oversight in selection of orchard site, or varieties of fruits, through careless pruning, neglect of thinning, improper feeding, or any such thing. He will do his best and take pride in his work along with the profits as they come to him.

CHAPTER XIV.

THE SPRAYING OF FRUITS.

THE most important advance in the management of fruit plantations within the past quarter-century has been the remarkable increase in the means of checking the ravages of insects and fungi by the use of liquid sprays. The spraying of orchard trees with poisons for the purpose of destroying insects is, at least in its modern development, of American origin. Arsenic in the form of Paris-green was early used against the potato-beetle, and in 1872 Le Baron, State entomologist of Illinois, suggested its use upon trees for the destruction of the canker-worm.* As early as 1876, this poison had attained to some popularity as a means of combating the canker-worm in Illinois and in Michigan, in the latter State under the advocacy of Prof. A. J. Cook. It appears to have been as late as 1878 that the first record was made of its use in New York, but a most important discovery followed the experiment there. In the spring of that year, J. S. Woodward, of Lockport, advised Edward P. Haynes to spray his apple-trees with Paris-green to destroy the canker-worm. In the fall, Mr. Haynes observed that the apples upon the sprayed trees were less wormy than those upon the others. The results of the experiments were reported the following winter before the Western New York Horticultural Society at Rochester. It is a curious fact that similar results were observed in this very year in Iowa in sprayings made with London-purple, under the auspices of Prof. J. L. Budd and

* See Lodeman, "The Spraying of Plants," for a complete history and discussion of spraying.

John M. Dixon. Fruit-growers were at first incredulous as to the value of the arsenites for the destruction of the larva of the codlin-moth, but by 1885 sufficient experience had accumulated to entitle the practice to the careful consideration of every progressive farmer. Spraying for the codlin-moth and many other orchard insects is now demonstrated to be of the greatest value, and it is a practice which every intelligent pomologist must employ.

The practice of spraying for fungous diseases had a separate origin. It originated in Southern France, in an attempt to check the mildew of the grape, a disease which had been introduced from America. The first definite efforts to treat plant-diseases by sprays in this country were made in 1884 and 1885, by Saunders and Goff. In the latter year, the Department of Agriculture began to publish advice, at first gleaned largely from French sources, respecting the treatment of these serious disorders; and it has prosecuted the work up to the present time with a persistence and efficiency which should win the admiration of the world.

The kerosene emulsions, and like compounds used for the destruction of various scales and other sucking insects, were of still independent origin. The kerosene emulsion is an American invention. The first successful emulsion with soap was probably made by Prof. A. J. Cook, of the Michigan Agricultural College, in 1877 and 1878. It was soon after recommended independently by Hubbard and Riley as the result of investigations upon the scale of the orange; and emulsions with milk were at the same time perfected by Barnard and Hubbard as the result of work upon the cotton-worm. Various soaps and oils have long been known to be effective insecticides. As early as 1840, whale-oil soap was used in this country for the destruction of the rose-chaffer, although its application to that insect is no longer considered to be efficacious.

Spraying is only one of several practices which are of fundamental importance in the care of fruit-plantations. Tillage, fertilizing, pruning and other care are cardinal methods in pomology, and their importance is none the less because spraying has been lately proved to be so essential. Spraying is a wholly secondary operation, and its importance is the

greater in proportion as the other care of the plantation is efficient, for the value of the product is thereby heightened. Many old and neglected orchards are scarcely worth the trouble and cost of spraying. The operation of spraying is not always necessary, and it does not, therefore, always give beneficial results. Unless insect or fungous troubles are present, there is no occasion for the operation; but inasmuch as these enemies are nearly always troublesome, and as no one can definitely prognosticate their absence, spraying comes to be an insurance. The risk is too great to allow the practice to be omitted in any year in apple and some other orchards; and the practice is efficient only when it anticipates the trouble.

The amount of spraying which shall be done in any particular case, as well as its kind and seasons, depends entirely upon the conditions and the enemies which it is desired to reach. The operator must first of all make a diagnosis of what his trouble is or is likely to be. If fungous troubles are present, or are likely to be, some of the compounds of copper or sulphur must be used. If leaf-eating or chewing insects—like canker-worm, codlin-moth larva, bud-moth larva, tent-caterpillar—are at work, some arsenical poison is to be used. If scale-like or lice-like insects—as bark-louse, San José scale, aphids—are present, soap, oil, or emulsion should be employed. In some fruits the operator can prognosticate given troubles with tolerable certainty. For instance, it is safe to assume that the apple will be attacked by the scab-fungus—except in very dry regions—and by the codlin-moth larva. Bordeaux-mixture is a specific for the former, and Paris-green for the latter. These materials may be combined and applied together with as good results as if each were applied separately. As a rule, two insurance sprayings are advised for the apple-orchard, the first one just as the blossom buds have opened, but before the flowers themselves have begun to expand, and the other about as soon as the last petals have fallen. The grower must determine if more sprayings are needed. If insect or fungous enemies are threatening, spray again. The fungous diseases are commonly most serious in wet seasons. As a general rule, there should be two sprayings for codlin-moth larvæ on the apple and pear (the apple-

worm) after the petals have fallen; but in average years the two early sprayings of Bordeaux-mixture advised above are sufficient for the scab-fungus. This first spraying will be too early to reach the codlin-moth larvæ, but inasmuch as various leaf-eating insects are common upon trees at this time, it will be well to add the Paris-green to the Bordeaux-mixture, particularly as the poison is cheap and does not in any way interfere with the application or with the fungicidal action of the Bordeaux-mixture.

It is a prevalent notion that spraying is bound to make orchards productive. Nothing could be more fallacious. The causes of unproductiveness are many. When such cause is insect or fungous injury, then spraying is a specific; but when the cause of unproductiveness is poor soil, lack of tillage and other care, poor varieties, and the like, spraying can have only a secondary and incidental effect in correcting the barrenness of the plantation. The general efficiency of spraying is well tested. The practice is now beyond the experimental stage, and the fruit-grower who does not resort to it is far behind his opportunities. There is still much to learn about mixtures, machinery, and the habits of insects and fungi; but spraying as a feature in the management of fruit-plantations rests upon as solid a basis of fact and demonstration as tillage or pruning does. This proof has been so unequivocal and so widely published, that it is doubtful if it is any longer incumbent upon the experiment stations to urge farmers to spray. The facts and methods are all accessible, and if, in the face of this evidence, the fruit-grower does not care to spray, he should be allowed to reap the harvest which he desires. It is very doubtful if laws designed to enforce spraying can be made of any service, for such laws always depend upon enlightened public sentiment for their support, and any mere perfunctory performance of the operation would profit nothing. Spraying must be deliberately and very thoroughly done if any benefit is to come of it, and such spraying is possible only when the operator is unreservedly convinced of its importance for his own plantations.

The efficacy of a spray depends upon hitting the enemy or in placing poison upon every portion of the surface upon which it works. Effective spraying, therefore, must cover

the entire surface of the plant. One completely thorough spraying, in which the plant is drenched, is more useful than a half-dozen perfunctory or half-hearted operations. The spray should be applied until the liquid begins to drip from the tree. If the operation is stopped as soon as this dripping begins, it is considered that there is no danger of turning stock into the orchard to feed upon the grass. At least, no cases of injury from such practice are on record. The number of sprayings can never make good the lack of thoroughness. Prepare for the operation in advance, preferably during the winter season. Be sure to know what the spray is to be applied for. Secure strong pumps and a variety of nozzles. Be on time with the work, do not be in a hurry while doing it, and consider that the spray protects the plant in proportion as the plant is well covered.

THE APPARATUS.

There is no one best pump or nozzle for all purposes. The operator needs different styles of tools for spraying as much as he does for working his land. The first requisite is that the pump be strong and capable of throwing much liquid. It

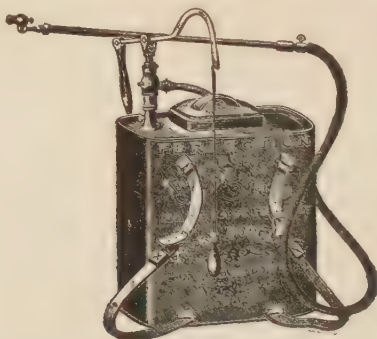


FIG. 294.—Knapsack Sprayer.

should be brass-lined, have a long, strong handle, a large (two inches in diameter or upward) cylinder, and it should be low and compact, so as not to catch in the limbs, or be top-heavy when mounted on a barrel or tank. As a rule, from ten to fifteen feet of hose should be used for each delivery, and one

man should manipulate only one hose. In large orchards one man should give his entire attention to pumping and driving, allowing the operator of the spray to give his entire thought

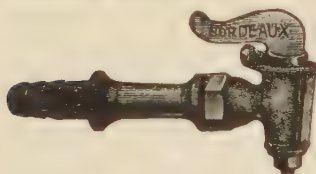


FIG. 295.—Bordeaux Nozzle.



FIG. 296.—Improved Vermorel Nozzle with Disgorger.



FIG. 297.—Reducer to attach half-inch to three-quarter-inch connection.



FIG. 298.—Another form of Vermorel Nozzle.

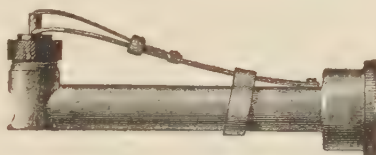


FIG. 299.—McGowen Nozzle.

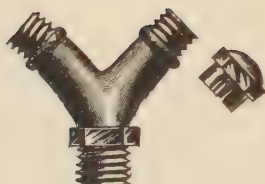


FIG. 300.—Y-Fixture for Vermorel Nozzles.

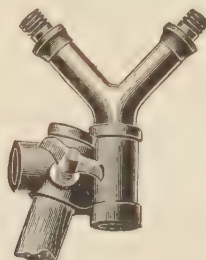


FIG. 301.—Y-Attachment for using Two Nozzles.

to his work. In tall trees the nozzle may be elevated upon a bamboo fishing-pole, or the operator may stand upon a platform above the tank. The exact form of the rig must depend

wholly upon the lay of the land and the character of the orchard. If the trees are high, far apart and well pruned, some kind of a high platform-rig will be useful. In thick orchards of low trees, a stone-boat may be used, the operator standing on the ground and raising his spray into the trees by means of a pole. This pole, with the hose secured near its top, is



FIG. 302.—Barrel Outfit Complete with Wheels.

often used. Many persons use a length of light gas pipe in the place of so much hose. There is now a pipe-lined bamboo pole which answers the purpose very well.

The various illustrations show some of the kinds of pumps which can be confidently recommended. For spraying orchards and vineyards, they should be mounted upon large casks or tanks, and these placed upon a wagon; but for limited plantations of small fruits, various cart and wheelbarrow sprayers are useful. It is generally advisable to mount the pump on the side of the cask, for the rig is then not top-heavy, the cask is easily filled with water, and the movement of the liquid in the barrel insures more perfect agitation than occurs

if the cask stands on end. Some agitator should be employed, however, for, if the material settles, the work is likely to be very unsatisfactory. For cask-outfits it is quite as well to stir the liquid with a stick just before spraying each tree as to depend upon some of the agitating devices which are in the market. Power pumps—unless run by steam—are inefficient in orchards of large trees, because sufficient liquid cannot be thrown while the machine is passing the tree. For vineyards, dwarf pears, small fruits and potatoes, however, the power sprayers are often very satisfactory. The knapsack sprayers are useful only for small areas or small plants, or where hand-labor is cheap.



FIG. 303.



FIG. 304.

Barrel Outfits with Agitators.

The best general nozzle for tall trees is probably the McGowen. It is a self-cleaning device and can be adjusted for coarse or fine spray. It throws more liquid than some other nozzles, but for this reason it allows of very expeditious work. Every orchardist should provide himself with the Vermorel, Bordeaux, and various other nozzles, however, and he will find them all useful for particular purposes. Some of the smaller of these nozzles, like the Vermorel, may be used twin by placing them upon a Y-fixture, as shown in the engraving.

MATERIALS AND FORMULAS.

Paris-green.—This compound of arsenic (aceto-arsenite of copper) is the standard insecticide for all chewing and biting insects, such as larvæ ("worms") and most beetles. A pound of it is used in two hundred to three hundred gallons of water for fruit-plants. For apple and pear and plum trees, the denser strength is generally preferred, but for peach-trees (upon which it is seldom necessary to use it) the weaker strength is recommended. If this mixture is to be used upon fruit-trees, one pound of quicklime should be added, for repeated applications will injure most foliage, unless the lime is used. Paris-green and Bordeaux-mixture can be applied together with perfect satisfaction. Use at the rate of four ounces of the arsenite to fifty gallons of the Bordeaux mixture. The action of neither is weakened, and the Paris green loses all caustic properties. Paris-green itself has slight fungicidal properties.

It sometimes happens that material which is obtained as Paris-green contains no arsenic. If the material is genuine Paris-green, it will quickly and completely dissolve in common strong ammonia, giving a beautiful, rich, dark blue, clear liquid, while any of the compounds which would ordinarily be substituted for Paris-green on account of their color and texture, will not behave in this manner in ammonia. Any insoluble residue is impurity. Chrome-green, which may be procured for Paris-green, will not dissolve in ammonia.

London-purple.—This is used for the same purposes as Paris-green, and in the same proportions. It is an arsenite of lime. Its advantages over Paris-green are its cheapness and the greater ease with which it is held in suspension in water, but these are not important merits. As it is very caustic, it should be applied with two or three times its weight of lime, or with the Bordeaux-mixture. The composition of London-purple is variable, and unless good reasons exist for supposing that it contains as much arsenic as Paris green, it is better to use the latter poison. Do not use London-purple on peach or plum trees unless considerable lime is added.

Substitutes for Paris-green.—Paris-green is still the standard

insecticide for spraying purposes, yet it has several serious defects: it is costly, does not remain long in suspension when applied in water, often burns the foliage of tender plants, and is variable in composition.

This has led several manufacturers to offer substitutes, chiefly compounds of white arsenic, lime, and copper sulphate, a few of which appear to be decidedly superior to Paris-green for spraying purposes. None of these trade arsenites, however, has been tested long enough to warrant a recommendation that it supplant the older insecticide. The only arsenite which has been thoroughly tested in many States and has given universal satisfaction is arsenite of lime. Two different compounds have been passing under this name. One is the "Taft Mixture," made by boiling together for forty-five minutes—

White arsenic,	.	.	.	.	.	1 pound.
Stone lime,	.	.	.	.	.	2 pounds.
Water,	.	.	.	.	.	1 gallon.

This makes a stock solution which may be kept indefinitely in a stoppered vessel. One quart of the stock solution to 50 gallons of water will be sufficient for most insects.

The "Kedzie Mixture" is an arsenite of lime made by boiling together until the arsenic dissolves—

Sal. soda,	.	.	.	.	.	8 pounds
White arsenic,	.	.	.	.	.	2 pounds
Water,	.	.	.	.	.	2 gallons

One pint of this stock solution and two pounds of slacked lime will make a barrel of spraying mixture equal in insecticidal value to one-quarter pound of Paris-green. The comparative merits of the two compounds are not yet determined, but both have given satisfaction. The chief advantages of both over Paris-green are cheapness and efficiency. The same insecticidal effect may be got for one-third the cost of Paris-green. Neither one will injure the tenderest foliage at the ordinary strengths. Both of these compounds can be made at home by a careful man. They seem to be destined to replace Paris-green in many parts of the country.

White Hellebore.—An ounce of the perfectly fresh material is applied in three gallons of water. Apply when thoroughly

mixed. This poison is not so energetic as the arsenites, and may be used a short time before the sprayed portions become edible. For insects which chew, but chiefly used for the currant-worm.

Tobacco Water.—This solution may be prepared by placing tobacco stems in a water-tight vessel, and then covering them with hot water. Allow to stand several hours, dilute the liquor from three to five times, and apply. For soft-bodied insects, especially for plant-lice.

Whale-oil Soap.—Used for various scale insects, in the proportion of one pound to five gallons of water. Some tender plants may be injured by this strength, if it is applied when they are in active growth. For San José scale, in winter, two pounds to the gallon.

Kerosene Emulsion.—Hard soap, one-half pound; boiling water, one gallon; kerosene, two gallons; dissolve the soap in the water, add the kerosene, and churn with a pump for five to ten minutes. Dilute four to twenty-five times before applying. Use strong emulsion for all scale insects, including the San José scale. For such insects as plant-lice, mealy-bugs, red spider, thrips, weaker preparations will prove effective. Cabbage-worms, currant-worms, and all insects which have soft bodies, can also be successfully treated with this emulsion. It is advisable to make the emulsion shortly before it is used.

Crude Oil and Water Mixture.—This is rapidly superseding kerosene emulsion for combating sucking insects. It is more economical than the emulsion and is easier to apply. For scale insects use a 15-per-cent. to 25-per-cent. mixture; for plant lice and thrips the 5-per-cent. strength is strong enough. Cabbage-worms, currant-worms, and other soft-bodied insects may also be treated successfully. This mixture, or emulsion, is made by pumps (of several patterns), which mix it automatically.

Bordeaux Mixture.—The leading fungicide, made of six pounds of copper sulphate (blue vitriol or blue-stone), four pounds of quicklime, forty to fifty gallons of water. This is the normal or 1.6 per cent. mixture. Dissolve the copper sulphate by putting it in a bag of coarse cloth and hanging this in a vessel holding at least four gallons, so that it is just cov-

ered by the water. Use an earthen or wooden vessel. When dissolved, pour the solution into the spraying barrel and fill the barrel half full of water. Slake the lime, dilute it to 10-15 gallons, and pour this milk of lime into the barrel through a wire strainer. Do not mix the copper sulphate and lime when less dilute than this, or the resulting Bordeaux will settle quickly. Add enough water to make forty to fifty gallons. It is then ready for immediate use. If the mixture is to be used on peach foliage, it is advisable to add two pounds of lime in the above formula. When applied to glossy-leaved plants, it will adhere better if about a pound of hard soap be dissolved in hot water and added to the mixture. Instead of weighing out the ingredients, the operator may simply add lime to a sulphate of copper solution and add occasionally a drop of a solution of ferrocyanide of potassium. When this ferrocyanide ceases to give a red or red-brown color upon being added to the mixture, the operator may know that sufficient lime has been added. Five cents' worth of this ferrocyanide (or yellow prussiate of potash) may be dissolved in a quart or two of water.

The tendency now is to use a weaker strength of Bordeaux than the 1.6 per cent. mixture, especially on plants with tender foliage, as peaches and plums. Three pounds of copper sulphate and four pounds of lime per barrel seems to give as good results in many cases as the stronger mixture.

Prepare stock solutions for the Bordeaux-mixture, rather than to make each batch in the quantities called for by the formula, if large quantities are needed. The sulphate of copper may be put into solution and kept in this condition indefinitely, ready for use. A simple method is to dissolve forty or fifty pounds of the sulphate in as many gallons of water, pulverizing the material and hanging it in a coffee-sack in the top of the barrel. A gallon of water, therefore, means a pound of sulphate. The lime may also be slaked and kept in readiness for use. Slake it into the creamy condition familiar to masons, cover lightly with water, and then close the box or vessel to prevent the water from evaporating. When making the Bordeaux-mixture, pour the requisite quantity of the stock solution of sulphate of copper into the barrel, and then dilute with four or five times the quantity of water. Now add the

creamy lime, and then add enough water to satisfy the formula. If the ferrocyanide test is used, place a spoonful of the mixture in a saucer or plate, and add a drop of the test solution. If a red color appears, the mixture needs more lime. If the test solution is added directly to a tank or barrel of the mixture, the color reaction is apt to be lost in the mass. An excess of lime insures the safety of the mixture, and it is always advisable to add a little more lime even after the ferrocyanide test is satisfied.

If the lime is thoroughly slaked and is allowed to settle before being used (only the thick, creamy portion being dipped off for making the mixture), the sediment will fall to the bottom of the slaking-box, and if the McGowen nozzle is used, the material will not need to be strained.

Ammoniacal Copper Carbonate.—Copper carbonate, one ounce; ammonia, enough to dissolve the copper; water, nine gallons; before making the solution the ammonia should be prepared as follows: Use 26° ammonia and dilute with seven to eight volumes of water. Then gradually add the necessary amount to the copper carbonate until all is dissolved. It is best treated in large bottles, and in them it will keep indefinitely. Dilute as required. For same purposes as the Bordeaux mixture, and used chiefly upon fruits after they are nearly grown, and upon ornamental plants, to avoid the discoloration which follows the use of Bordeaux mixture. Generally considered to be inferior to the Bordeaux mixture in fungicidal action.

Copper Sulphate Solution.—The simple solution of copper sulphate is now being used more extensively as a substitute for Bordeaux in spraying dormant trees and in place of the ammoniacal carbonate of copper for spraying ripening fruit. For the first purpose it may be used at the rate of one pound to 15-25 gallons. This strength should never be applied to trees which are in foliage. For spraying fruit (especially for the plum rot) the strength should be one pound to 200-300 gallons. Use the weaker solution on peaches and Japanese plums. It does not stick like Bordeaux, and must be applied about twice as often in order to be effective.

Potassium Sulphite Solution.

Potassium Sulphite,	$\frac{1}{2}$ to 1 oz.
Water,	1 gal.

This loses strength on standing and should be used at once. The standard fungicide for gooseberry mildew, but scarcely superior to Bordeaux for this purpose.

Iron Sulphate and Sulphuric Acid Solution.—Water (hot) 100 parts; iron sulphate, as much as the water will dissolve; sulphuric acid (commercial), 1 part.

The solution should be prepared just before using. Add the acid to the crystals, and then pour on the water. Used for grape anthracnose, the dormant lines being treated by means of sponges or brushes.

SPRAY CALENDAR.

(Adapted from Lodeman, Bulletin 114, Cornell Experiment Station.)

In the following directions, only the most common and serious orchard pests—both insects and fungi—are mentioned. The number and sequence of the sprayings are indicated by the figures. The sprayings which are commonly of least importance in parentheses. No absolute rules can be given for the spraying of plants. The fruit-grower must be able to diagnose his trouble and to judge for himself how the weather, abundance of the enemy, and other conditions should modify the treatment. The calendar gives simply a few general suggestions. The operator must fill in all the details.

1. *The Orchard.*

APPLE—*Scab*.—1, Copper sulphate or Bordeaux before buds swell; 2, Bordeaux mixture when fruit-buds are opening, but before flower-buds expand; 3, repeat as soon as blossoms have fallen; 4, Bordeaux mixture ten to fourteen days after the third; (5, 6, repeat 4 at intervals of about two weeks). Two or three sprayings are usually sufficient. *Canker-worm*.—1, When first caterpillars appear, apply arsenites very thoroughly; 2, repeat 1 after three or four days; (3, 4, repeat

every few days if necessary). Everything depends upon being on time. Sticky bands or straps placed around the trunks of the trees are effective in keeping the female moths from ascending. *Bud-moth*.—1, As soon as leaf-tips appear in buds, arsenites; 2, repeat 1 before the blossom-buds open; (3, repeat 2 when blossoms have fallen). *Codlin-moth*.—1, Arsenites immediately after blossoms have fallen; 2, repeat 1, seven to ten days later; (3, 4, arsenites at intervals of one to three weeks, after 2 especially, if later broods are troublesome). Arsenites may be added to the Bordeaux mixture and the two applied together with excellent effect. Two sprayings are commonly sufficient for the codlin-moth larva. *Case-bearer*.—As for *bud-moth*.

PEAR—*Leaf-blight* or *Fruit-spot*.—1, Just before blossoms open, Bordeaux mixture; 2, after fruit has set, repeat 1; 3, the same two weeks later. If further applications are necessary, use copper sulphate or ammoniacal carbonate of copper. *Leaf-blister*.—1, Before buds swell in spring, kerosene emulsion, diluted five to seven times. *Psylla*.—1, When first leaves have unfolded in spring, kerosene and water, 5-10 per cent.; 2, 3, etc., at intervals of two to six days repeat 1 until the insects are destroyed. *Slug*.—Treat the same as for cherry slug. *Codlin-moth*.—Treat the same as for apple.

The true pear-blight (or fire blight) cannot be controlled by spraying, so far as known. This disease is distinguished by the uniform dying of the entire leaf, and the leaves hang upon the tree. The leaf-blight, mentioned in the last paragraph, causes the leaves to become spotted and to fall.

PLUM—*Brown-rot*.—As for peach, which see. *Leaf-blight*.—1, Copper-sulphate solution, before buds swell; 2, When fruit has set, Bordeaux mixture; 3, 4, etc., repeat 2 at intervals of two or three weeks; use a clear fungicide after fruit is three-quarters grown. *Black-knot*.—1, During first warm days of early spring, Bordeaux mixture; 2, repeat 1 when buds are swelling; 3, during latter part of May, repeat 1; 4, repeat 1 during middle of June; (5, repeat 1 in July). All knots should be cut out and burned as soon as discovered. *Curculio*.—Spraying is not always satisfactory; jar the trees after fruit has set, at intervals of one to three days during two to five weeks. *Plum Scale*.—1, In autumn when leaves

have fallen, 25 per cent. kerosene and water mixture; 2 and 3, in spring, before buds open, repeat 1.

PEACH—*Brown-rot*.—1, Before buds swell, copper-sulphate solution; (2, before flowers open, Bordeaux mixture); 3, when fruit has set, repeat 2; 4, repeat after ten to fourteen days; 5, when fruit is nearly grown, amoniacal copper carbonate; 6, 7, etc., repeat 5 at intervals of five to seven days if necessary. *Curculio*.—See Plum.

CHERRY—*Black-knot*.—As for plum. *Rot*.—1, As for plum. *Aphis*.—1, 10 per cent. kerosene and water when insects first appear; 2, 3, repeat at intervals of three to four days if necessary. It is essential to be on time with this treatment. *Slug*.—1, When insects appear, arsenites, hellebore or air-slaked lime; 2, 3, repeat 1 in ten to fourteen days if necessary. *Curculio*.—See Plum.

QUINCE—*Leaf-blight* or *Fruit-spot*.—1, See under Pear. *Rust*.—Same treatment as for leaf-blight. *Curculio*.—See under Plum.

ROSE-CHAFER or ROSE-BUG.—A very difficult insect to combat. There is no good remedy. Spraying thick lime white-wash on the plants is a fairly good repellant. Kerosene emulsion is also partially efficient. Hand-picking and bagging the fruit, where these means can be employed, are always to be recommended. The insects breed in sandy lands. These breeding places should be kept in constant tith, and never seeded down.

SAN JOSÉ SCALE.—For nurserymen with infested stock, fumigation with hydrocyanic-acid gas; for those with infested growing trees, a crude oil and water mixture from 60 to 80 per cent., dependent upon the specific gravity of the oil. Details on the methods of application may be obtained from many experiment station bulletins. Whale-oil soap and kerosene emulsion are no longer practicable remedies, because they are so costly and disagreeable to apply. Resin washes are used with success in California.

2. The Vineyard.

Anthracnose.—1, Before buds break in spring, sulphate of iron and sulphuric-acid solution; 2, repeat 1 after three or

four days to cover untreated portions. If spraying for rot, no further treatment is necessary; if not, two or three applications of Bordeaux will be beneficial. No treatment is wholly satisfactory. *Black-rot*.—(1, as soon as first leaves are fully expanded, Bordeaux mixture); 2, after fruit has set, Bordeaux mixture; 3, repeat 2 at intervals of two to three weeks until fruit is three-quarters grown; 4, ammoniacal copper carbonate when fruit is nearly grown; 5, 6, etc., repeat 4 at intervals of seven to fourteen days as required. *Downy Mildew*, *Powdery Mildew*.—The first application recommended under *Black-rot* is of especial importance. *Ripe-rot*.—Apply very thoroughly the later applications recommended under *Black-rot*. *Steely-bug*.—1, As buds are swelling, arsenites; 2, after ten to fourteen days, repeat 1. *Flea-beetle*.—1, Arsenites as the buds swell. 2, Arsenites when worms appear on the leaves.

3. Small Fruits.

CURRENT—*Leaf-blights*.—1, When injury first appears, before the fruit is harvested, ammoniacal copper carbonate, to avoid staining the fruit; 2, after fruit is harvested, Bordeaux mixture freely applied; 3, repeat 2 when necessary. *Worm*.—1, When first leaves are nearly expanded, arsenites; 2, after ten to fourteen days, hellebore; 3, repeat 2 if necessary.

GOOSEBERRY—*Mildew*.—1, Before buds break, Bordeaux mixture; 2, when first leaves have expanded, Bordeaux mixture or potassium sulphite; 3, 4, etc., repeat 2 at intervals of seven to ten days, if necessary, throughout the summer. Avoid staining the fruit. Thorough and timely spraying will keep the mildew completely in check. *Worm*.—See Current, above.

RASPBERRY, BLACKBERRY, and DEWBERRY—*Anthraxnose*.—1, Before buds break, copper-sulphate solution; also cut out badly infested canes; 2, when growth has commenced, Bordeaux mixture; 3, 4, etc., repeat 2 at intervals of one to three weeks; avoid staining fruit by use of clear fungicide. Only partially successful; better treatment is short rotation, cleaning off the old patch as soon as it becomes diseased. *Orange-rust*.—Remove and destroy affected plants as soon as discovered. *Saw-fly*.—1, When first leaves have expanded,

arsenites; 2, after two to three weeks repeat 1, or apply kerosene and water (unsatisfactory).

STRAWBERRY—*Leaf-blight*.—1, When growth begins in spring, Bordeaux mixture; 2, when first fruits are setting, repeat 1; 3, during fruiting season, ammoniacal copper carbonate; 4, after fruiting, or on non-bearing plants, Bordeaux mixture at intervals of one to three weeks. Short rotations are best preventives of disease. Select resistant varieties. *Saw-fly*.—Spray plants when not in bearing with arsenites, repeating application if necessary.

CHAPTER XV.

TERMS USED IN DESCRIBING FRUITS.

It is only by a uniform and definite use of terms that descriptions can be made intelligible to the reader. Hence a full explanation of these terms becomes a matter of importance. Distinctive characters should be permanent, and not liable to variation with a change of locality, soil, season, or climate; or, if variable, the nature of such variation should be distinctly pointed out. To assist the cultivator the more fully to understand written descriptions, the devotion of a few pages to a clear explanation of the terms used in this work may prove useful.

I. GROWTH OF THE TREE, SHOOTS, AND LEAVES.

The form of growth often affords a good distinctive character of varieties, not liable to great variation. Young trees, only a few years old, usually exhibit peculiarities of growth more conspicuously than old trees of irregular spreading branches. Hence, in all cases where this character is mentioned, it refers to young trees not more than three or four years from the bud or graft, unless otherwise expressed.

1. Shoots are *erect*, when they rise nearly perpendicularly from the main trunk or stem, as in the Early Strawberry apple and Bartlett pear (Fig. 305).

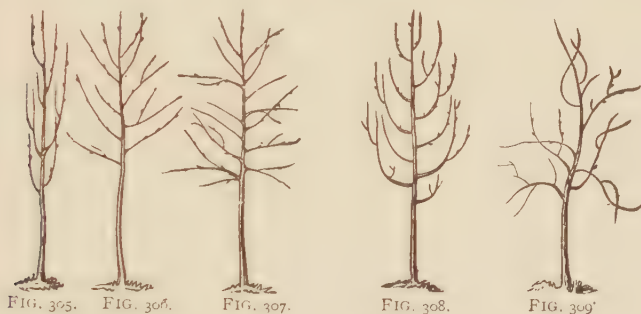
Diverging, when they deviate from the perpendicular at an angle of about forty-five degrees, considerable variation being found in the same tree; as in the Domine and Ribston Pippin (Fig. 306).

Spreading, when they more nearly approach a horizontal direction, as in most trees of the Rhode Island Greening (Fig. 307).

Drooping, when they fall below the horizontal, a form which many spreading shoots assume, as they become the large branches of older trees.

Ascending, when they curve upward, as in the Gravenstein apple, and small Red Siberian Crab (Fig. 308). Erect trees usually partake more or less of this quality, but the Early Harvest is free from it.

Irregular, when they assume no very distinct growth, but more or less a mixture of the preceding, as Black Gilliflower and Summer Bonchretien pear.



Showing Forms of Growth.

Straggling, similar to the next preceding, but with shoots more slender and curved, as Winter Nelis and Black Worcester pear (Fig. 309).

Shoots are *straight*, as in the Early Harvest and Northern Spy apples; *flexuous*, or more or less deviating from a straight line, as in the Swaar and Roxbury Russet. This distinction is very apparent and uniform in young and very thrifty trees, but not in older ones of feeble growth.

They are *stout*, as in the Red Astrachan; *slender*, as in the Jonathan apple and Winter Nelis pear.

Trees with erect straight shoots when young, usually form more regular and compact heads in older trees; and those of a spreading habit, more irregular or drooping heads.

Some trees which grow very rapidly when young, are small when of full size, examples of which are found in the Late Strawberry and Tallman Sweeting. Others at first grow more slowly, but ultimately become large, as the Esopus Spitzenburgh. Some varieties, again, continue to increase rapidly

in size at all periods, as the Northern Spy; while others of feeble growth when small, never attain much magnitude, as the Early Joe and Sine Qua Non.

2. *The color* of the shoots varies greatly in the same variety at different periods of the year, as well as with different degrees of exposure to the sun, and with a change of soil, climate, and season. When fresh or very young, all have a greenish color, but gradually assume various shades of yellow, olive, brown, red, purple, and nearly black, as the season advances, and as they become bare and are exposed to the sun and weather. For this reason, in describing the color, the terms must be relative, and can only be correctly applied by a comparison at the time with the color of other sorts. During winter, and early in the spring, the shoots of most trees become so much darker than at other times, that it is only by practice and by placing the different sorts side by side, that accuracy may be attained. Skilful culturists will readily distinguish, by a glance at the color of the shoots, many of the kinds they cultivate; but the peculiar cast is hard to describe in words, in the same way that it is impossible to describe the handwriting of an individual, so as to be known from fifty others, although many can, at a glance, know the penmanship of hundreds of different persons. A few of the most strongly marked cases, however, present peculiarities of color, which form useful points of distinction. No one, for instance, could easily mistake the *yellow* shoots of the Bartlett and Dix pears, for the dark brown or purple of the Tyson and Forelle; or the light greenish cast of the Bough and Sine Qua Non apples, for the dark color of the Northern Spy, or dark brown of the Baldwin; nor the downy or grayish appearance of the Ladies' Sweeting and Esopus Spitzenburgh, for the clear shining brown of the Gravenstein and Red Astrachan. Nearly all shoots are more or less downy at first, but the down disappears as they grow older. Hence the term must be used relatively. In plums, the smooth or downy shoots afford in most cases good distinctive points.

3. *The Buds* sometimes afford distinct characteristics. As examples, the large, compact, and projecting buds of the Summer Bonchretien always contrast strongly with the smaller, more rounded, and softer buds of the Madeleine.

Buds are large on the Swaar and Golden Sweet, small on the Tallman Sweeting and Rhode Island Greening.

4. *The Leaves*, in a large number of instances, are of use in distinguishing different varieties.

They are *even* (not wrinkled), as in the Bartlett pear and Baldwin apple (Fig. 310).



FIG. 310.—Even Leaf.



FIG. 311.—Waved Leaf.



FIG. 312.—Wrinkled Leaf.

Waved as in the Tallman Sweeting and Beurre d'Aumalis pear (Fig. 311).

Wrinkled, when the waves are shorter and more irregular, as in Green Sweet (Fig. 312).

Flat, as in the Madeleine and Skinless pears (Fig. 313).

Folded and recurved, as in the Easter Pear and Bonchretien (Fig. 314).



FIG. 313.
Flat Leaf.

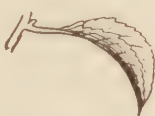


FIG. 314.
Folded Leaf.



FIG. 315.
Erect Leaf.



FIG. 316.
Drooping Leaf.

Large and wide, as in the Red Astrachan and Huling's Superb.

Narrow, as in the Dyer apple, and Van Mons' Leon le Clerc pear.

Erect, as in the Early Strawberry (Fig. 315).

Drooping, as in Domine (Fig. 316). But these two last are indistinct characters, and only to be resorted to in a very few remarkable instances, as most leaves are erect on new shoots, and become spreading or drooping as they grow older.

The *color* of the leaves may sometimes assist in description,

as *light green* in the Yellow Bell-flower and Rambo; *deep green*, as in the Rhode Island Greening; and *bluish green*, as Peck's Pleasant. Color varies with soil and tillage.

The *serratures*, or *saw-teeth markings on the margins of leaves*, are characteristics of importance, in many varieties of the apple, and on the peach they are so well defined as to form a basis of the classification of varieties. The latter will be found particularly described in the separate chapter on the peach.



FIG. 317.—Sharply Serrate. FIG. 318.—Double Serrate. FIG. 319.—Crenate.

Leaves of apples are—

Serrate, or cut with teeth like those of a saw.

Sharply serrate, when every serrature ends in a sharp point, as in the Fall Pippin (Fig. 317).

Doubly serrate, when the serratures themselves are again minutely serrated, as in the Vandevere and Drap d'Or (Fig. 318).

Coarsely serrate, as in the Swaar.

Crenate, when the teeth are rounded, as in the Esopus Spitzenburgh (Fig. 319).

Obtusely crenate, when the teeth are unusually rounded, as in the Bough.

Finely crenate, when the rounded teeth are small, as in the Summer Queen.

When the serratures are partly rounded, and irregularly and rather deeply cut, they become *toothed*, as in Ladies' Sweeting (Fig. 320).

Many varieties present intermediate degrees, as—

Serrate-crenate, partaking somewhat of both, as the Jersey Sweeting and Summer Rose.

Crenate-toothed, as in Bevan's Favorite.

Serrate, slightly approaching toothed, as in Rambo.

5. *The Flowers*.—In apples, pears, cherries, plums but little external difference exists in the flowers. In the peach and nectarine, however, an important division in classification is made by the great difference between those with large and small petals; one class, including the Early Ann, Grosse Mignonne, and others, having large, showy flowers; and another class, comprising the Early Crawford, George IV., and many more, having flowers with small, narrow petals.



FIG. 320.—Toothed Leaf.

II. FORM OF THE FRUIT.

In the following pages, the *base* of a fruit or any other part of production of a tree is the portion toward the branch or root. This is in accordance with the language universally adopted in describing plants. It has, however, been more or less departed from in the common language used to describe fruits, and especially so as applicable to the pear. This deviation from scientific accuracy tends to confusion, and if simplicity of expression is sought, ambiguity must be avoided. The apex of the stalk of a fruit, however, where it joins the fruit, may, in all cases, be termed the *insertion*.



FIG 321.

The term *apex* should be understood as applying to the part most remote from the branch or root. In fruits, it is the part opposite to the insertion of the stalk. In pears, this part is usually denominated the *crown*.

The *axis* is a line connecting the base and apex (Fig. 330).

A *longitudinal section* is made by cutting an apple from base to apex.

A *transverse section*, by cutting it at right angles to the axis.

The *length* is the longitudinal diameter; the *breadth* the transverse diameter.



FIG. 322.—Oblate.



FIG. 323.—Conical.



FIG. 324.—Ovate.

A fruit is *round* when nearly spherical, as the Fameuse and Green Sweet.

Roundish, when varying slightly from round, or when the length and breadth are nearly equal, as the Dyer and Gravenstein.

Oblate, *flat*, or *flattened*, when the height is much less than the breadth, as the Rambo and Maidens' Blush (Fig. 322).

Conical, when tapering from the base to the apex, as Bullock's Pippin (Fig. 323).

Ovate, or egg-shaped, when the length rather exceeds the breadth, with a rounded taper from base to apex, as in the Esopus Spitzenburgh (Fig. 324).

Obovate, or reversed ovate, is when the smaller end of an egg-shaped fruit is at the base, as the Buffum and Dearborn Seedling pears (Fig. 325).

Oblong, when the length exceeds the breadth, and the sides are nearly parallel, as Kaighn's Spitzenburgh (Fig. 326).

Obtuse, when the parts are rounded or blunt.

Acute, when any part as the neck of a pear, tapers to nearly a point (Fig. 327).

Fruits may partake of forms variously combined, as—

Round-ovate, when nearly round with a slight rounded taper to apex, as Ladies' Sweeting (Fig. 328).

Round-conical, nearly the same as the last, but with the taper less rounded.

Oblong-conical, as the Yellow Bell-flower.

Oblong-ovate, as the Black Gilliflower.

Oblate-conical, as the Rhode Island Greening and Hawthorn-den (Fig. 329),



FIG. 325.
Obovate.



FIG. 326.
Oblong.



FIG. 327.
Acute.



FIG. 328.
Round-ovate.



FIG. 329.
Oblate-conical.

Depressed, pressed down, sunk or shortened, applied to the apex of peaches, strawberries, etc.

Flattened at the ends, when the base and apex only are flattened, as the Winter Pearmain. An oblong fruit, though not flat, may be flattened at the ends; a conical fruit may be flattened at base.

Compressed, pressed together, when the sides are flattened, as in some apricots, plums, etc.

The **CAVITY** is the hollow in which the stalk or stem of a fruit is placed (Fig. 330).

The **BASIN** is the depression which contains the calyx, eye, or remains of the blossom (Fig. 330).

A cavity may be *shallow*, *narrow*, *deep*, or *broad*.

It may be *obtuse*, or somewhat blunt or rounded, at bottom, as in the Petre pear and Pomme Grise apple (Fig. 331).

Acute, when simply ending in a sharp point at bottom, as the Baldwin (Fig. 332).

Acuminate, when ending in a long-drawn-out taper, as the Fall Pippin (Fig. 333). The Holland and Fall Pippin are dis-

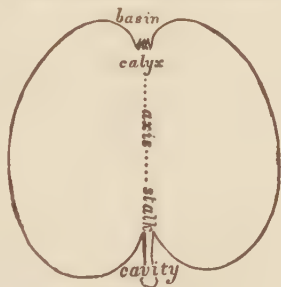


FIG. 330.

tinguished from each other by the rather obtuse cavity of the former, and acuminate cavity of the latter.

The BASIN is always narrow in any fruit having a narrow or pointed apex (Fig. 336); it is usually wide in fruits having a



FIG. 331.
Obtuse Cavity.



FIG. 332.
Acute Cavity.



FIG. 333.
Acuminate Cavity.

wide or obtuse apex, as the Rambo (Fig. 334); but where the rim or boundary is broad and obtuse, the basin may be narrow, as in the St. Lawrence and Gravenstein (Fig. 337).

It is *distinct* when well defined.

Abrupt, when the depression breaks off suddenly from the rim (Fig. 335).

FIG. 334.—Wide Basin.

FIG. 335.—Abrupt Basin.



FIG. 336.—Narrow Basin.



FIG. 337.—Narrow Basin.

Even, when not furrowed or wrinkled.

Angular, with several corners.

Wrinkled, having small irregular hollows and ridges.

Waved, with gentle and irregular undulations of surface.

Furrowed, when more regularly channelled.

Plaited, having small, straight, and regular ridges.

Ribbed, with larger and more obtuse or rounded ridges.

PEARS have peculiar forms which render some additional terms necessary:

Many pears have a *neck*, or narrower part toward the stalk, and a *body*, or larger part toward the crown (Fig. 338).

They are distinctly *pyriform* when the sides formed by the

body and neck are more or less concave or hollowed, as in Fig. 338, shown by the dotted lines.

Turbinate, or top-shaped, when the body is nearly round and a short rounded acute neck, as in the Bloodgood (Fig. 339).

The form of different pears is further distinguished by the form of the different parts:

The neck may be long, as in the Calebasse.

Narrow, as in the Bosc (Fig. 340).

Short, as in the Glout Morceau (Fig. 341).

Obtuse, as in the Bartlett.

Acute, as in the Jargonelle (Fig. 342).

Distinct, as in the Bosc.

Obscure, as in the Seckel.

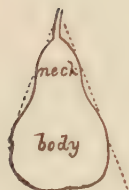


FIG. 338.
Pyriform.



FIG. 339.
Turbinate.



FIG. 340.
Narrow Neck.



FIG. 341.
Short Neck.



FIG. 342.
Acute Neck.

The body may be *heavy* or *large*, when greatly exceeding in size the neck, as the Catillac.

Light or *small*, when not much larger than the neck, as the Washington; in which case the fruit approaches oblong in form.

Oblate, or flattened, as in the Frederick of Württemberg.

Round, as in the Jargonelle.

Conical, as in the Vicar.

Ovate, as in the Marie Louise.

Cultivation influences considerably the form of pears. Thus, on a young, thrifty tree, the Seckel pear has a slight neck; on an old, heavily laden tree, the neck is obsolete. The body, when ovate or slightly conical on young trees, becomes rounded on older trees, and even flattened in rare instances.

CHERRIES may be *round*, *cordate* or heart-shaped, or *ovate*.

STONE FRUITS usually have a furrow on one side, extend-

ing from the stalk to the apex, termed a *suture* (literally meaning a *seam*), which sometimes occurs on both sides. It is *large*, when wide and deep; *distinct*, when clear or well defined; *obscure*, when faint; *obsolete*, when not existing, or only a faint line on the surface.

COLOR OF FRUIT.—The lightest-colored fruit is white, as the Snow peach; next, yellowish-white; pale yellow; yellow; and deep yellow. The addition of red produces, successively, orange yellow, orange, orange red, rich warm red. Shades of red—clear red, crimson when darkened, purple when blue is added, violet less blue than in purple. Amber is a very light yellowish-brown. Fawn color is a light reddish-brown, with a slight admixture of gray.

A fruit is *striped*, when in alternating broad lines of color.

Streaked, when the lines are long and narrow.

Marbled, when the stripes are wide, faint, irregular, or waving.

Blotched, of different abrupt shades, without any order or regularity.

Clouded, when the blotches are broader and more softly shaded.

Stained, having the lighter shades of a blotched or clouded apple.

Splashed, when the stripes are much broken and of all sizes.

Mottled, covered with nearly confluent dots.

Dotted, when these dots are more distinct.

Spotted, when the dots become larger.

TEXTURE OF FRUIT.—*Hard*, those which need the artificial aid of cooking to soften them sufficiently, as the Catillac pear.

Breaking, when tenderer than the preceding, but not yielding to the simple pressure of the mouth, as the Summer Bonchretien.

Buttery, when the flesh forms a soft mass, yielding to the pressure of the mouth, as in the White Doyenné and Seckel pears.

Melting, when the flesh becomes nearly or entirely liquid by this pressure, as in the Madeleine. These qualities may be combined, as breaking and melting, in the Washington; breaking and buttery, in the Onondaga; buttery and melting, in the Tyson, and in most of the best varieties of the pear

The texture may be fine, granular, coarse, gritty, fibrous, tough, crisp, or tender.

THE FLAVOR may be *sweet, neutral, slightly sub-acid* or mild sub-acid, *sub-acid, acid, very acid*, or *austere*; *aromatic* or spicy; *perfumed*, or possessing odor, and with more or less of a shade of musk; *astringent*, usually a defect, but sometimes an excellent quality, if in a very minute proportion; *rough*, astringent and austere; *vinous*, rich, high-flavored, and rather acid; *sugary*, or saccharine, sometimes nearly sweet, possessing the qualities of sugar, which may be mixed with acid.

THE QUALITY is designated by *first, second*, and *third* rates; and fruits perfectly worthless by still lower grades. A second-rate fruit, to be worthy of cultivation, must possess other good qualities in a high degree, as hardness, productiveness, fair appearance, etc. Very few fruits as low as third rate, can ever be worth retaining, and only for extreme earliness or other uncommon quality. Fruits that possess desirable qualities are usually designated by three degrees of flavor; the lowest, including the best of second-rate fruits, or "good second rate," are termed *good*; the lower grade of first-rate fruits are termed *very good*, or *fine*; and the highest quality of all are *best, very fine*, or *excellent*. Examples—Maiden's Blush apple, Napoleon pear, Lombard plum, and Crawford's Early peach, are *good*; Rhode Island Greening, Bartlett pear, Graffion or Bigarreau cherry, and Red Gage plum, are *very good* or *fine*; and Swaar apple, Seckel pear, Downton cherry, and Green Gage plum, are *excellent* or *best*.

CHAPTER XVI.

AGRICULTURAL EXPERIMENT STATIONS.

IN the year 1887, President Cleveland signed an act then known as the "Hatch bill," passed after long discussion, providing for the establishment in each State and Territory of a station for scientific investigation and experiments respecting the principles and applications of agricultural science, and for diffusing among the people such useful and practical information. Up to the close of the fiscal year, June 30, 1898, 54 stations had been established. In Canada there are five experiment farms under government control. The results already attained by the hundreds of able and painstaking men connected with these institutions are of the utmost value. The bulletins constantly emanating from them, embodying the results of their enlightened research, conveying information and advice of the greatest practical value to every cultivator of the soil, cannot fail to add to their successes, to lessen the possibilities of disappointment, and to increase the comfort and enjoyment of the individual and the wealth of the nation.

These bulletins are sent, on application, free to the residents of every State in which the station is located. From these stations may be obtained the most reliable suggestions and advice as to the varieties of fruit of every kind, suited for cultivation in their State. No one should plant large orchards without first corresponding with his Agricultural Experiment Station.

In consequence of the greater knowledge and accuracy concerning the adaptability of various fruits to the different States thus at the command of every one, the lists of fruits recommended for special States, which previous editions of this work contained, have now been omitted.

The Acts of Congress establishing Agricultural Experiment Stations, and a full list of them, are here given, together with their post-office address. Communications should in all cases be addressed "Director, Agricultural Experiment Station," followed by the post-office and State.

ACT OF 1887 ESTABLISHING AGRICULTURAL EXPERIMENT STATIONS.

AN ACT to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided,* That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the legislature of such State or Territory shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their dif-

ferent stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purpose of this act. It shall be the duty of each of said stations annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

SEC. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 5. That for the purpose of paying the necessary ex-

penses of conducting investigations and experiments and printing and distributing as the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: *Provided, however,* That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SEC. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SEC. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second, aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural

college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made to such separate agricultural college or school, and no legislature shall by contract express or implied disable itself from so doing.

SEC. 9. That the grants of moneys authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants: *Provided*, That payment of such instalments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the Secretary of the Treasury.

SEC. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

Approved, March 2, 1887.

EXTRACT FROM AN ACT MAKING APPROPRIATIONS FOR THE
DEPARTMENT OF AGRICULTURE FOR THE FISCAL YEAR END-
ING JUNE THIRTIETH, EIGHTEEN HUNDRED AND NINETY-
FIVE.

AGRICULTURAL EXPERIMENT STATIONS: To carry into effect the provisions of an act approved March second, eighteen hundred and eighty-seven, * * * and to enforce the execution thereof, seven hundred and forty-five thousand dollars, twenty-five thousand dollars of which sum shall be payable upon the order of the Secretary of Agriculture to enable him to carry out the provisions of section three of said act of March second, eighteen hundred and eighty-seven; and the Secretary of Agriculture shall prescribe the form of the annual financial statement required by section three of the said act of March second, eighteen hundred and eighty-seven; shall ascertain

whether the expenditures under the appropriation hereby made are in accordance with the provisions of the said act, and shall make report thereon to Congress; and the Secretary of Agriculture is hereby authorized to employ such assistants, clerks, and other persons as he may deem necessary, and to incur such other expenses in travelling, stationery, and office fixtures as he may find essential in carrying out the objects of the above acts, and the sums apportioned to the several States shall be paid quarterly in advance. And the Secretary of Agriculture is hereby authorized to furnish to such institutions or individuals as may care to buy it copies of the card index of agricultural literature prepared by the Office of Experiment Stations, and charge for the same a price covering the additional expense involved in the preparation of these copies, and he is hereby authorized to apply the moneys received toward the expense of the preparation of the index.

LIST OF EXPERIMENT STATIONS.

ALABAMA.

- Agricultural Experiment Station of the Agricultural
and Mechanical College of Alabama,
AUBURN, ALA.
- Canebrake Agricultural Experiment Station,
UNIONTOWN, ALA.
- Tuskegee Agricultural Experiment Station,
TUSKEGEE, ALA.

ALASKA.

- Alaska Agricultural Experiment Station,
SITKA, ALASKA.

ARIZONA.

- Agricultural Experiment Station of the University of
Arizona,
TUCSON, ARI.

ARKANSAS.

Arkansas Agricultural Experiment Station,
FAYETTEVILLE, ARK.

CALIFORNIA.

Agricultural Experiment Station of the University of
California,
BERKELEY, CAL.

COLORADO.

Agricultural Experiment Station,
FORT COLLINS, COL.

CONNECTICUT.

The Connecticut Agricultural Experiment Station,
NEW HAVEN, CONN.
Storrs Agricultural Experiment Station,
STORRS, CONN.

DELAWARE.

The Delaware College Agricultural Experiment Station,
NEWARK, DEL.

FLORIDA.

Agricultural Experiment Station of Florida,
LAKE CITY, FLA.

GEORGIA.

Georgia Experiment Station,
EXPERIMENT, GA.

HAWAII.

Federal Station,
HONOLULU, HAWAII.
Sugar Planters' Station,
HONOLULU, HAWAII.

IDAHO.

Agricultural Experiment Station of the University of
Idaho,
MOSCOW, IDAHO.

ILLINOIS.

Agricultural Experiment Station of the University of
Illinois,
URBANA, ILL.

INDIANA.

Agricultural Experiment Station of Indiana,
LAFAYETTE, IND.

IOWA.

Iowa Agricultural Experiment Station,
AMES, IOWA.

KANSAS.

Kansas Agricultural Experiment Station,
MANHATTAN, KAN.

KENTUCKY.

Kentucky Agricultural Experiment Station,
LEXINGTON, KY.

LOUISIANA.

No. 1. Sugar Experiment Station, Audubon Park,
NEW ORLEANS, LA.

No. 2. State Experiment Station,
BATON ROUGE, LA.

No. 3. North Louisiana Experiment Station,
CALHOUN, LA.

MAINE.

Maine State College Agricultural Experiment Station,
ORONO, ME.

MARYLAND.

Maryland Agricultural Experiment Station,
COLLEGE PARK, MD.

MASSACHUSETTS.

Hatch Experiment Station of the Massachusetts Agricultural
College,
AMHERST, MASS.

MICHIGAN.

Experiment Station of Michigan Agricultural College,
AGRICULTURAL COLLEGE, MICH.

MINNESOTA.

Agricultural Experiment Station of the University of
Minnesota,
ST. ANTHONY PARK, MINN.

MISSISSIPPI.

Mississippi Agricultural Experiment Station,
AGRICULTURAL COLLEGE, MISS.

MISSOURI.

Missouri Agricultural College Experiment Station,
COLUMBIA, MO.
Fruit Station, MOUNTAIN GROVE, MO.

MONTANA.

Montana Agricultural Experiment Station,
BOZEMAN, MON.

NEBRASKA.

Agricultural Experiment Station of Nebraska,
LINCOLN, NEB.

NEVADA.

Nevada Agricultural Experiment Station,
RENO, NEV.

NEW HAMPSHIRE.

New Hampshire College Agricultural Experiment
Station,
DURHAM, N. H.

NEW JERSEY.

New Jersey Agricultural Experiment Stations.
NEW BRUNSWICK, N. J.

NEW MEXICO.

Agricultural Experiment Station of New Mexico,
MESILLA PARK, N. M.

NEW YORK.

New York Agricultural Experiment Station,
GENEVA, N. Y.
Cornell University Agricultural Experiment Station,
ITHACA, N. Y.

NORTH CAROLINA.

North Carolina Agricultural Experiment Station,
RALEIGH, N. C.

NORTH DAKOTA.

North Dakota Agricultural Experiment Station,
AGRICULTURAL COLLEGE, N. D.

OHIO.

Ohio Agricultural Experiment Station,
WOOSTER, O.

OKLAHOMA.

Oklahoma Agricultural Experiment Station,
STILLWATER, OKLA.

OREGON.

Oregon Experiment Station,
CORVALLIS, ORE.

PENNSYLVANIA.

The Pennsylvania State College Agricultural Experiment Station,
STATE COLLEGE, PENN.

PORTO RICO.

Agricultural Experiment Station,
MAYAGUEZ, PORTO RICO.

RHODE ISLAND.

Rhode Island Agricultural Experiment Station,
KINGSTON, R. I.

SOUTH CAROLINA.

South Carolina Agricultural Experiment Station,
CLEMSON COLLEGE, S. C.

SOUTH DAKOTA.

South Dakota Experiment Station,
BROOKINGS, S. D.

TENNESSEE.

Tennessee Agricultural Experiment Station,
KNOXVILLE, TENN.

TEXAS.

Texas Agricultural Station,
COLLEGE STATION, TEX.

UTAH.

Agricultural Experiment Station,
LOGAN, UTAH.

VERMONT.

Vermont Agricultural Experiment Station,
BURLINGTON, VT.

VIRGINIA.

Virginia Agricultural and Mechanical College Experiment Station,
BLACKSBURG, VA.

WASHINGTON.

Washington Agricultural Experiment Station,
PULLMAN, WASH.

WEST VIRGINIA.

West Virginia Agricultural Experiment Station,
MORGANTOWN, W. VA.

WISCONSIN.

Agricultural Experiment Station of the University of Wisconsin,
MADISON, WIS.

WYOMING.

Wyoming Agricultural Experiment Station,
LARAMIE, WY.

CHAPTER XVII.

RULES ADOPTED BY THE AMERICAN POMOLOGICAL ASSOCIATION FOR NAMING AND DESCRIBING FRUITS.

Rule 1.—The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

Rule 2.—The society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same when they shall occur in its discussions or reports; and also to recommend such changes for general adoption.

Rule 3.—The name of a fruit should preferably express, as far as practicable by a single word, a characteristic of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

Rule 4.—Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given precedence.

Rule 5.—To entitle a new fruit to the award or commendation of the society, it must possess (at least for the locality for which it is recommended) some valuable or desirable quality or combination of qualities in a higher degree than any previously known variety of its class and season.

Rule 6.—A variety of fruit having been once exhibited, examined, and reported upon, as a new fruit, by a committee of the society, will not thereafter be recognized as such so far as subsequent reports are concerned.

A rule governing the revision of names was authorized by the society at its meeting in Washington in September, 1891, as follows:

Prefixes, suffixes, apostrophic terminations, and secondary words, together with words whose significations are expressed in the descriptive columns of the catalogue, are eliminated from the names of fruits, save in a few cases in which they may be needful to insure the identity of a variety and in a few time-honored names.

The anglicising of foreign names is resorted to only in the interest of brevity or pronounceability.

In questionable cases, subsidiary words are retained in parentheses.

Part Two.

**ON THE
DIFFERENT KINDS OF FRUIT.**

Spraying Apple Trees

For years fruit growers have been told that they should spray their trees within ten days after the petals fall if they would control coddling moth. Recent experiments have shown that this is offering far too much latitude. Satisfactory control can be obtained only by spraying within five days after the dropping of the petals. This is especially true if the weather is warm, for then the calyx closes quickly. The poison must get into the open calyx, for nearly all the first brood make their entrance at that point.

Small fruit growers will save money and labor by following the example of commercial growers and adding some form of casein to their spray material. This applies to all summer spraying with liquids. If there are only a few trees, ordinary skimmed milk may be

used successfully. It makes the poison stick to such an extent that the same amount of material will go from thirty to forty percent further.

No bordeaux mixture should be used on fruit trees after the petals have fallen. Much burning has been done because this rule has not been adhered to. There are other causes of burning, however. Even plain water applied when the sun is shining brightly may cause the leaves to turn brown. All spraying with liquid poisons is best done in the early evening or late in the afternoon.

The synonyms on all the following pages are given in parentheses.

The dates for the ripening of fruits given in this book are mostly adapted to the Northern States; they should be about three weeks earlier for the latitude of Southern Virginia, and six weeks earlier for the Gulf States.

Fertilizing Apple Trees

Recent very careful experiments have shown that much fertilizer has been wasted on apple trees. The only kind of fertilizer which apples seem to need is some form of nitrogen. Nitrate of soda is most commonly used, but some of the manures, and particularly poultry manure, have been found very satisfactory. Experience has shown that better results are obtained by applying all of the fertilizer early in April rather than at intervals throughout the summer.

If nitrate of soda is being used, six or eight pounds is not too much for well established fruit trees. On the other hand, no more than half a pound should be given to very young trees, and the fertilizer should always be spread in a wide circle at some distance from the trunk. The feeding roots usually extend beyond the spread of the branches.

CHAPTER XVIII.

APPLES.

"THE APPLE," says Downing, "is the world-renowned fruit of temperate climates." Although less delicious than the peach or pear, it possesses, from its great hardiness, easy cultivation, productiveness, its long continuance through the whole twelve months, and its various uses, an importance not equalled by any other fruit.

Nursery Management.—The mode of raising the seedlings or stocks, and of Budding and Grafting has been already described in Chapter III. of the first part of this work. The seedlings are treated in three different ways. They may be set out into nursery rows in the spring, when a year old, to be budded the second summer; they may be taken up and root-grafted as soon as large enough; or they may be planted into rows and grafted at any subsequent period.

The following figures exhibit the difference between good and bad planting-out. Fig. 343 represents a graft well set out, the earth packed closely around the root, which is sending out new fibres, and the leaves expanding above. In Fig. 344 the work has been carelessly done, the earth being closed around the top, but left with a cavity below. Grafts set in this way rarely grow.

Fig. 345 represents the usual form of the dibble, and Fig. 346 the appearance of the root-graft when ready to be set out.

The most favorable soils are rich, well-pulverized, and rather strong loams. If light or gravelly, there is more danger from midsummer droughts, which often prove quite destructive. Grafting the whole root entire will much lessen the difficulty.

The chief care afterward is to keep the ground constantly cultivated, and perfectly clean, which will increase the growth during summer, and exclude mice in winter; the trees are to be trained up to one leading-stem, not trimming so closely as to make them slender; they are to be kept straight, by tying

them when necessary to upright stakes; and all destructive insects must be watched and destroyed.



FIG. 343.—Root-Graft, set out well, with earth compactly pressed against its roots.



FIG. 344.—Root-Graft, badly set out, with a cavity below.

If the ground is rich and kept perfectly clean, they will grow from one and a half to two feet the first summer after grafting; to three or four feet the second summer; five to six or seven feet the third summer, when many of them will be large enough for removal to the orchard, and most of the remainder in one year more.



FIG. 345.—Dibble.



FIG. 346.—Root-Graft ready for setting.

Root-grafting is extensively performed in large nurseries; but on unsuitable soils, budding is found the most certain of success, the buds being rarely destroyed, and only by the most unfavorable winters. The bud remaining dormant the first summer, the growth is one year later than on grafted stocks of the same age; but this difference is made up by the more rapid growth of the shoot from the bud, which is usually twice as great as that of a graft on the root. To obtain

handsome and good trees, the bud should be set within two or three inches of the ground. Budded trees usually have better roots than root-grafted ones, and are the common stock in the East.

PLANTING ORCHARDS.

Soil.—The apple is a vigorous and hardy tree, and will grow upon most soils. It does best, however, on those that are deep, rich, and fertile, such as will give good crops of Indian corn. Hard, shallow, and wet grounds are to be avoided. Improvement by manuring and deep cultivation is desirable, as a great difference in quality and productiveness results from a difference in fertility.

Distance.—Where the quantity of ground is limited, and in rare cases, trees may for a time stand within fifteen or twenty



FIG. 347. Diagram of Rows for Tree Planting.

feet; but for large and permanent orchards they should not be nearer than forty feet. There is, however, a material difference in the size of varieties, hence a variation may be allowed. But this variation in distance should not break the rows which are to be preserved for convenience in cultivation. The rows may be kept entire, by varying the distance in one way only, as in the annexed figure (Fig. 347). The middle portion is for trees of the largest size, as the Esopus, Fall Pippin, and Rhode Island; those of smallest size, as Bough, Yellow Harvest, and Sine Qua Non, are on the left; and those of middle growth, as the Swaar, Black Gilliflower, and Tolman Sweet, are on the right. On the plains, the trees may be planted somewhat closer, as the trees do not attain such great size as in the Northeastern States.

Transplanting.—Full directions have been given in a preceding chapter, where the superior advantages of broad, deep, and loose beds of earth, made by heavy subsoiling and manuring, have been pointed out; or in the absence of this excellent preparation, by digging large holes to be filled with rich mould, or manured surface-soil.

CULTIVATION.

The importance of thorough cultivation has been already noticed, and cannot be too well understood. If two specimens could be exhibited side by side, the one showing the stunted, lingering, mice-eaten, and moss-covered trees, caused by neglect; and the other, the vigorous and thrifty growth, and the fair and abundant crops, resulting from fine and clean culture,—none could fail to be satisfied of the superiority of the one and impolicy of the other.

RENOVATING AN OLD ORCHARD.

It is not an easy matter to outline treatment for an old and barren orchard. One cannot often tell just why such an orchard does not bear. Through long years of neglect the trees have got into a non-bearing habit, and it may be next to impossible by any kind of treatment to thoroughly renovate and recuperate them. The one safe thing always to advise is better care and good tillage. If the orchard has not been ploughed for many years, it is probable that the roots are so high that ploughing is practically impossible. In that case it is well to make a surface mulch by cutting up the sod when rather moist and soft with a spading harrow, spring tooth harrow, or other strong surface-working tool. After the sod is once broken, it can be got into fine and mellow condition, and thereafter surface tillage may be employed to hold the moisture. In most cases it will be necessary to prune the lower limbs in order to allow a team to work in the plantation. If the heads are so low that a team cannot work in the orchard even after the trees are pruned, it may be well to apply an annual mulch of straw or litter. After the ground is once mellow on top, it may pay to add stable manure or commercial fertilizer. If one has only a few such trees, he may dig a trench around the tree somewhere near the edge of the spread of limbs, and put manure therein.

The trees should be pruned. Heavy pruning of the top induces wood growth. This pruning therefore will tend to reinvigorate the trees and to correct any of the mistakes of earlier years. Heavy pruning is not a direct means of setting trees into bearing; in fact, it is rather a means of setting them into growing. But after they have been renovated by

this means, they may be expected soon to slow down and to come into bearing condition, after which time a moderate or light annual pruning should keep them in shape. Scrape off the hanging bark. Spraying with fungicides and insecticides should be begun with the other treatment.

The way to make apple-trees bear well is to give good and thoughtful treatment from the time they are set. To begin with such treatment late in life is necessarily only corrective, and too much should not be expected of it.

Bearing orchards commonly lose their vigor, and give small and poor fruit, when allowed to grow in grass-land, without any cultivation. If the soil is naturally rich, a shallow ploughing and an occasional harrowing will restore their vigor. Or if ploughing cannot conveniently be given, they may be much improved by being converted to pasture for sheep, adding occasionally a top-dressing of manure in autumn. These animals will serve in part to enrich the land, keep the grass grazed short, and pick up the prematurely fallen fruit, infested with worms or insects.

The amount of cultivation or top-dressing to be given to such orchards must be determined by the annual growth of the shoots. If less than a foot in length, more vigor must be imparted to them. If more than a foot and a half, they are quite thrifty enough.

Pruning.—The mode of treating large trees has been already adverted to in the chapter on pruning. There are some owners of orchards who most erroneously suppose that when trees become old, heavy pruning will restore their vigor in the absence of good cultivation; while the correct mode of treatment is very moderate and gradual pruning, in connection with the best of cultivation. The foregoing correct portraits of actually existing specimens of bad



FIG. 348.—Illustration of Bad Pruning of Old Trees.

pruning unhappily have too many originals over the country (Fig. 348). This most unsightly mode of trimming is often adopted when a removal of the top by grafting is intended.

Grafting New Tops on Old Trees.—It often happens that fruit on large trees is worthless, and it becomes an important object to change the top by grafting or budding it with some better variety. In this case, instead of cutting off large



FIG. 349.—Proper Pruning to form New Heads on Old Trees.

branches and grafting them at once, it is better to prune the top in part, as shown by Fig. 349, which will cause an emission of vigorous shoots. These are then budded or grafted with ease and success. And, as the grafts gradually extend by growth, the remainder of the top may, by successive excisions, be entirely removed. Where trees are not too old, and the ground is kept cultivated, good-sized trees are thus obtained much sooner than by setting out young ones.

To give a well-shaped head to such newly formed trees, and to prevent the branches from shooting upward in a close body near the centre of the tree, the old horizontal boughs should be allowed to extend to a distance in each direction, while the upright ones should be lopped. This is distinctly exhibited in Fig. 349.

The following judicious mode of renewing the old tops of trees formerly regarded as worthless, was given by the late George Olmsted, of Hartford, Conn., in the *Horticulturist*:

“These trees I commenced grafting six years ago last spring. *I began on the top, and grafted one-third of the tree each year.* It therefore required three years to complete the entire heads of the trees.

“I like this method better than any I have ever tried for grafting large trees, as it gives the grafts a good opportunity to get well started. Cutting off and grafting the top first gives the grafts there the best possible chance, while the necessary reduction of the top throws the sap into the remaining side-branches, which fits them well for grafting the following year; and the third year, the lowest branches being

made ready in the same way, may be grafted successfully. By this mode, it will be seen that when the grafts are put in the side-branches, they are not shaded by the heavy shoots above them, and they have an unusual supply of nourishment to carry them forward. Those who have attempted to graft the whole head of a large tree at once are best aware of the great difficulty in the common mode of getting the grafts to take on the *side-limbs*.

"One of these large trees so treated is probably more than seventy-five years old, and has now an entirely new and vigorous head, grafted with this excellent variety. When I began with it, the fruit was only fit for cider, and it was questionable whether the tree should not be cut down. By grafting it in this manner, I have added surprisingly to its value. Two years ago (the bearing year), I obtained from it ten bushels of apples; last year eight bushels; and this year (only six years from the time I began to graft it), I gathered twenty-eight and a half bushels of excellent fruit!

"I consider this tree now worth one hundred dollars; the cost of grafting it was about five dollars; and the latter was all repaid two years ago—the first season the grafts bore fruit."

The bearing year of apple-trees which yield excessive crops is only every alternate year; but by thinning out a large portion of the fruit while yet small, the exhaustion will not be so great as to render the tree barren the second season, and it will bear annually. By picking off all the young fruit, the bearing year may be entirely changed, or one bough may be made to bear one year, and another bough the second year.

Depredators.—The insect enemies of the apple have been already described. Mice, which sometimes girdle and destroy young trees, especially such as are neglected and allowed to grow in grass, may be excluded by a small mound of earth, thrown up about ten inches high around the stems late in autumn. This earth should be compact and smooth, and not consist of turf, which is liable to cavities, instead of repelling the depredators. Fig. 350 shows the mode of performing this operation. If well



FIG. 350.—Mode of Banking up Trees to Protect from Mice.

done, it has never failed to protect the trees. One man will go over some hundreds in a day. In the following spring this earth is again levelled.

Rabbits are excluded by tying woven wire netting or stiff painted paper around the stems eighteen inches high, or, easier, by rubbing fresh blood upon the bark every few weeks during winter, which may be done by using a piece of fresh liver for this purpose.

CHANGES WROUGHT BY CLIMATE AND SOIL.

This subject has been treated, as applied to fruits generally, in a former part of this work; a few brief remarks on the variations in the apple may be interesting.

The winter apples of the Northern States, when cultivated farther south, are changed to autumn apples; and as far south as Georgia, some of our good keepers ripen nearly by the end of summer. The Baldwin and Rhode Island, at Cincinnati and at St. Louis, cease to be winter fruits. There are few or none of the northern apples which succeed well as keepers as far south as Carolina. This is owing to the long southern summers. It has been found that varieties originated in the Southern States are generally best adapted to the climate of that region.

Some varieties are greatly influenced by a change of climate and others but slightly. The Ribston, so excellent at Montreal, is of little value a few degrees further south. The Rhode Island and the Roxbury, on suitable soils, throughout New York and New England, present the same characteristics of flavor and appearance; the Baldwin, so fine at the east, greatly deteriorates in northern Ohio; and the Belmont, which has been pronounced the most valuable of all apples at Cleveland, is unworthy of cultivation at Cincinnati. These changes, in the latter instances, may perhaps be ascribed to a difference in soil; and the application of special manures, as lime, potash, etc., on those unfavorable soils, has improved the quality. The periods of ripening, given in the following pages, are intended to apply to the Northern States. A difference of about two or three weeks exists between fruits cultivated at Boston or Rochester, and

in central Ohio and southern Pennsylvania, and other differences of latitude nearly in the same ratio.

DWARF APPLES.

For summer and autumn sorts, dwarf apples are valuable in affording a supply to families. They begin to bear in two or three years from setting out, and at five or six years, if well cultivated, will afford a bushel or so to each tree. A portion of a garden as large as the tenth of an acre may be planted with forty or fifty trees, without crowding. All the different varieties of the apple may be made Dwarfs by working on the Paradise or Doucin stock—the former are smaller and bear soonest; the latter are large and ultimately afford the heaviest crops. Among the handsomest growers as dwarfs are Red Astrachan, Jersey Sweet, Porter, Baldwin, Dyer, Summer Rose, Benoni, and Bough.

THE AGE AT WHICH APPLE-TREES BEGIN TO FRUIT.

To those who wish fruit at the earliest time after setting out trees, the following results of observations at the New York General Agricultural Experiment Station is of interest and value. Probably most trees obtained from nurseries are two to three years old, and the time of fruiting after this will no doubt vary somewhat with the location, soil, and cultivation given them. The list is by no means complete, and from it are here quoted only those in general cultivation:

Baldwin	8 years
Ben Davis	4 "
Carolina June	4 "
Cooper's Market	5 "
Dominie	5 "
Oldenburg	2 "
Early Harvest	4 "
Early Strawberry	had not fruited at 9 "
Esopus Spitzenburgh	9 "
Fallawater	5 "
Fall Pippin	9 "
Fameuse	5 "
Gideon	4 "

Golden Russet	9 years
Golden Sweet	9 "
Gravenstein	8 "
Green Newtown Pippin	5 "
Haas	2 "
Jefferis	4 "
Jersey Sweeting	4 "
Keswick	3 "
King, Tompkins County. . . .	5 "
Lady Sweet	9 "
Longfield	4 "
Maiden's Blush	4 "
McMahon's White	4 "
Melon	4 "
Monmouth	5 "
Mother	9 "
Munson's Sweet	5 "
Northern Spy	9 "
Peck's Pleasant	7 "
Pewaukee	5 "
Pomme Grise	5 "
Primate	3 "
Pumpkin Russet	9 "
Pumpkin Sweet	9 "
Rambo had not fruited at	9 "
Rawle's Janet	5 "
Red Astrachan	5 "
Red Beitigheimer	8 "
Red Russet	9 "
Rhode Island Greening	5 "
Rome Beauty	2 "
Sops of Wine	5 "
Stump	7 "
Sutton's Russet	9 "
Tallman's Sweet	8 "
Tetofsky	4 "
Twenty Ounce. . . .	5 "
Vandevere	5 "
Wagener	4 "
Westfield Seek-no-further	9 "

William's Favorite	3 years
Winesap	5 "
Yellow Bellflower	9 "
Yellow Transparent	4 "

VARIETIES.

SYNOPSIS OF ARRANGEMENT.

Division I. SUMMER APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division II. AUTUMN APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division III. WINTER APPLES.

Class I. *Sweet Apples.*

Section I. Color striped with red.

Section II. Color not striped.

Class II. *With more or less acidity.*

Section I. Color striped with red.

Section II. Color not striped.

Division IV. CRAB APPLES.

The characteristics which constitute these divisions and subdivisions are not in all cases perfectly distinct. Summer apples gradually pass into autumn, and autumn into winter apples. A few, but the number is extremely small, possess nearly a neutral flavor between a dead sweetness and slight acidity. Again, apples classed with those that are striped

sometimes present a nearly uniform shade of red; and in rare instances, the brown cheek of a green or yellow variety exhibits faint stripes.

But these may be regarded rather as exceptions to general characters, which are on the whole as clearly defined as any other distinctive points of the different varieties. Controlling circumstances will produce changes in all fruits, and descriptions are not founded on extreme exceptions, but on *average* characteristics.

The *SIZE* is designated by comparison;—for example, the Swaar and Baldwin are *large*; Herefordshire and Tolman Sweet are *medium*; English Golden Pippin and Lady are *small*. Qualifying terms give a more precise meaning—as the Fall Pippin and Monstrous are *very large*; Hawley and Mignonne are *quite large*, Bullock and Early Strawberry are *rather small*; and the Siberian Crab is *very small*.

The illustrations in this chapter are all taken from average sized specimens of the fruit, and uniformly reduced in size one-half. The more valuable varieties are indicated by an asterisk, thus*.

DIVISION I.—SUMMER APPLES.

CLASS I.—SWEET APPLES.

Section I.—Striped with red.

Beautiful Arcade. Medium, oblong, truncated, angular; white, yellow splashed with crimson on side. A marked characteristic is the roughened surface; cavity slightly abrupt, slightly wavy, stem very short; basin wide, corrugated; flesh yellow, firm, fine-grained, sweet, and rich; best quality. Summer. Fig. 358. Russian.

Foster. Large, roundish; indistinctly striped, pale red on yellow, stalk short, calyx open; basin deep, ribbed, sweet, rich. August. Massachusetts.

Sweet Borovinka. Medium, roundish, oblate; yellow, striped, and splashed with red; cavity acute; stem short; basin wide, shallow, corrugated; flesh white, firm, juicy, mild, quality good. Summer. Fig. 355. Russian.

Section II.—Not striped.

Golden Sweet.* Medium or rather large, roundish, slightly flattened; greenish, becoming pale yellow; stalk an inch or more long, slender; cavity acuminate; basin moderate; flesh very sweet, good, of moderate quality. The fruit is always fair, the tree a free grower, and very productive. Buds large; leaves sharply serrate. Late in summer. Valuable for culinary purposes. Tender far West; succeeds well Southwest. Connecticut. Fig. 359.

Hightop.* (Summer Sweet of Ohio, Sweet June.) Rather small, roundish, regular; skin smooth, light yellow; cavity deep, narrow; calyx small, in a shallow, slightly furrowed basin; flesh yellowish, very sweet, rich: tree upright, productive. A valuable summer sweet apple at the West. Massachusetts. Fig. 353.

FIG. 351.—Sweet Bough.

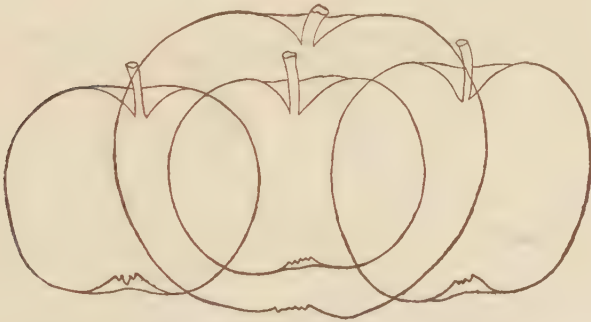


FIG. 353. Hightop Sweeting. FIG. 354. Early Harvest. FIG. 352. American Summer Pearmain.

Manomet. (Manomet Sweeting.) Size medium, roundish; yellow, with a rich cheek; stalk rather slender, cavity shallow; basin shallow, furrowed; flesh tender, sweet, rich. Late summer. Massachusetts.

Sweet Bough.* (Large Yellow Bough, Early Sweet Bough.) Large, roundish, remotely conical-ovate, sometimes distinctly conical; pale greenish yellow, stalk one-half to an inch long; basin narrow, deep; flesh white, very tender, with an excellent sweet flavor. Ripens from the middle to the end of summer. A moderate and regular bearer. Shoots yellowish, somewhat irregular, ascending; tree round-headed; leaves obtusely crenate. Fig. 351.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section I.—Striped with red.

American Summer Pearmain.* (Early Summer Pearmain, of Cox) Medium in size, oblong, slightly inclining to truncate-conical; nearly covered with fine broken streaks and dots of red; stalk

nearly one inch long; basin round, even, distinct; very tender, often bursts in falling; sub-acid, flavor fine. Continues to ripen for several weeks in late summer and early autumn. Needs good and rich cultivation. Growth rather slow. This is distinct from the English Summer or Autumn Pearmain, in its larger size, higher red, more oblong form, and superior quality. Fig. 352.

Aromatic Carolina. Large, oblate-conic, oblique; pale red with heavy bloom; flesh tender and melting, flavor aromatic and excellent. July. Tree spreading. An abundant bearer. Southern.

Benoni.* Medium in size, roundish, sometimes obscurely conical; deep red on rich yellow, in distinct broken stripes and dots; stalk half an inch long; basin small; flesh yellow tender, rich; mild sub-acid, "very good." Late summer. Tree erect, good bearer. Has not succeeded well in all localities. A native of Dedham, Mass. Fig. 364.

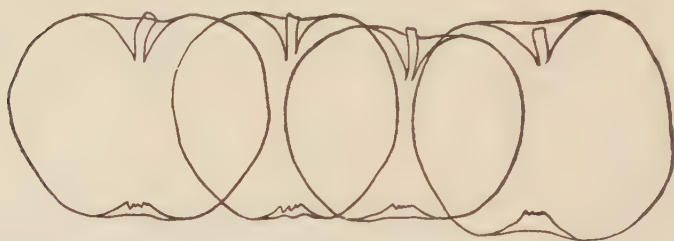


FIG. 355. Sweet Borovinka. FIG. 356. Sweet Pepka. FIG. 357. Smoky Arcad. FIG. 358. Beautiful Arcad.

Carolina Red June.* (Red June, Blush June.) Size medium, oblong, very red; flesh white, tender, juicy, sub-acid, with a sprightly, agreeable flavor; quite early, and continues to ripen for four weeks, and will keep long after ripe for a summer apple; profitable for market. The tree is a fine erect grower, very hardy, bears young and abundantly. The most valuable early apple in northern Illinois and adjacent region. Hardy at the West. North Carolina. Fig. 360.

Carolina Watson. Large, greenish yellow, red, striped; flesh white, tender, sub-acid; tree vigorous. Alabama. Summer.

Early Joe.* Size medium or rather small; oblate, sometimes obscurely approaching conical; smooth and regular; color, with numerous short, broken, red stripes on yellow ground, a nearly uniform deep red to the sun, with conspicuous white specks; stem three-fourths of an inch long, rather thick; cavity shallow, acute; basin small, even; flesh fine grained, very tender, slightly crisp, juicy, sub-acid, spicy, quality "best." Ripens the last two weeks of summer. Shoots dark, growth slow. A profuse bearer. Fig. 362. Origin, East Bloomfield, N. Y.

Early Norfolk. Medium, oblate; yellow striped and blotched red; flesh white, sub-acid. Said to bear transportation well. July. Virginia.

Early Pennock. Fruit large, roundish, conical; striped bright red on greenish yellow; stem long; cavity deep; irregular; flesh yellowish white, rather coarse, sub-acid, of rather poor quality. Esteemed at the West for its hardiness and productiveness. August and September.

Early Red Margaret. Medium, round-ovate; striped with dull red, somewhat russeted; stalk half an inch long, thick; basin plaited, narrow, very shallow; flesh sub-acid, tender, good when fresh; ripens at wheat harvest, scarcely earlier than Early Harvest. Shoots erect, downy; moderate bearer. England.



FIG. 359.—Golden Sweet.



FIG. 360.—Carolina Red June.

Early Strawberry.* (American Red Juneating, of *Manning*.) Rather small, roundish, varying to round-ovate, and sometimes quite conical; surface indistinctly and finely striped with bright and deep red, tinging faintly the flesh; stalk slender, three-quarters to an inch and a half long; basin small and narrow; flesh white, tender, sub-acid, rather brisk, pleasant, not very rich. Ripens one to three weeks later than Yellow Harvest. Growth, very erect; leaves erect, finely crenate. Productive. Good in all localities. New York. Fig. 361.

Fourth of July. Above medium, roundish oblate, often slightly conic; striped red on pale yellow, with a white bloom; flesh yellowish, tender, rather acid, of moderate quality; ripens very early, productive. Valuable for cooking and profitable for market. Cultivated at the West. Of foreign origin.

Foundling. Rather large, oblate-conic, ribbed; striped red on yellowish green; stalk short, slender, cavity large, basin small, furrowed; flesh yellow, tender, with a rich, sub-acid flavor. Late summer. Massachusetts.

Garden Royal. Below medium, roundish, slightly flattened at ends, even and regular; surface with small, broken, red stripes on yellow ground, deep red to the sun; stalk short, or half to three-

fourths of an inch long, slender, cavity acute; calyx large, open; basin very shallow; flesh yellowish white, exceedingly tender, and fine-grained; flavor mild, sub-acid, fine. A poor grower, but a first-rate dessert fruit. Late summer. Origin, Sudbury, Mass.

Hocking. (Townsend.) Rather large; striped red on yellow; cavity wide; basin shallow, slightly ribbed; flesh fine-grained, tender, mild sub-acid. August. An upright, vigorous, productive tree. Valued at the West. Pennsylvania.

Julian. (Julin.) Fruit medium, roundish, conical; calyx small in a narrow basin, stem short in a moderate cavity; striped with fine red on yellowish white; flesh white, tender, and fine flavored. One of the finest summer apples at the South, where it ripens at midsummer.

FIG. 361.—Early Strawberry.

FIG. 364.—Benoni.

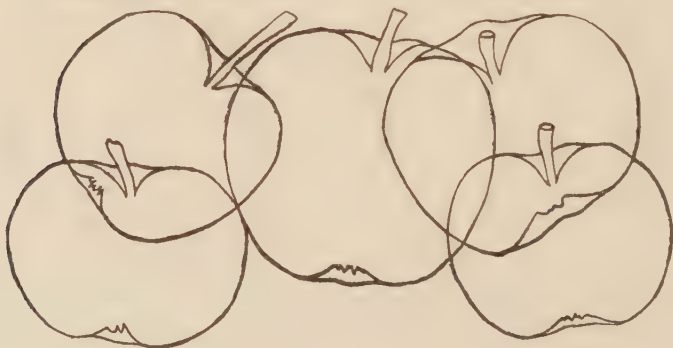


FIG. 362.
Early Joe.

FIG. 363.
William's Favorite.

FIG. 365.
Summer Rose.

Klaproth. Size medium, oblate; streaked and stained with red on greenish yellow; stalk short, cavity deep; basin wide, even; flesh white, crisp, with a pleasant sub-acid flavor. Tree a strong grower and great bearer. Fruit bears carriage well. A good market sort. Lancaster County, Pa. August to October.

Raspberry. (*Red Cheek*.) Small, oblong truncated; yellow, covered rosy red; cavity narrow; basin wide, almost flat; flesh white stained with red; sub-acid, juicy, sprightly, best. Resembles Red June. Tree hardy and healthy. Russian. Fig. 394.

Sops of Wine.* Medium size, round-ovate, dark red, stalk long, slender; flesh white, often stained red, moderately juicy, sub-acid, of good flavor. Valuable for its free growth and fair fruit. Late summer. The *Sapson* is smaller, firmer in flesh, and less valuable. Fig. 392.

Summer Hagloe. Size medium, roundish conic; streaked with bright red on yellow ground; stalk rather short and thick; flesh very soft, rich, of fine quality. Ripens at the end of summer. An excellent culinary variety. Shoots dark, strong, thick; terminal buds very large.

This is wholly distinct from the *Hagloe Crab*, a late, small, ill-shaped, ovate fruit, cultivated only for cider.

Summer Queen. Rather large, roundish-conical, somewhat ribbed; striped with bright red on rich yellow ground; stalk an inch and a half long; cavity small, acute; basin small, furrowed; flesh yellowish, rather acid, spicy, very rich. Fine for cooking. Late summer. Good on warm, sandy soils, poor on cold clay. Shoots light colored, leaves finely crenate. Hardy far West.

Summer Rose.* (Woolman's Early, Lippincott's Early, Woolman's Striped Harvest.) Medium or rather small, roundish-oblate; yellowish, blotched, and streaked with red; stalk rather short; basin round, slightly plaited; flesh very tender, slightly crisp, texture fine, mild sub-acid, juicy, excellent. Begins to ripen with wheat harvest, and continues a month. Tree a slow grower but productive. Too small for market but good for home use. New Jersey. Fig. 365.

Williams' Favorite.* (Williams, Williams' Red, Williams' Favorite Red. Size medium, sometimes rather large; oblong-ovate, remotely conical, very smooth; color mostly fine dark crimson stripes; stalk three-quarters to one inch long, enlarged at insertion, cavity shallow; basin small and shallow, even, or somewhat ribbed; flesh yellowish white, moderately juicy, with sometimes a tinge of red near the surface, mild, agreeable, fine. Ripens for several weeks late in summer. Its handsome appearance has partly contributed to its high reputation. Requires a rich soil and good cultivation. Fig. 363. Origin, Roxbury, Mass.

Section II.—Not Striped.

Cole's Quince. Large, round, oblate, ribbed; yellow; mellow when ripe, mild, rich, high quince flavor. Cooks well before ripe. Productive. Maine. Hardy far West.

Early Harvest.* (Yellow Harvest, Prince's Harvest, Early French Reinette, July Pippin. Size medium, roundish, usually more or less oblate, smooth; bright straw color when ripe; stalk rather short and slender; calyx moderately sunk; flesh nearly white, flavor rather acid, fine. Ripens at wheat harvest, and for three weeks afterward. Shoots erect, slightly diverging, straight, often forked. Productive. Needs rich cultivation to be fine. Good throughout the northern States and Southwest, tender Northwest. Fig. 354.

Fanny.* Fruit large, roundish; skin deep crimson; flesh tender, sub-acid, very good. Season, August. Popular in the East. Pennsylvania.

Garrettson's Early. Size medium, roundish-conic; skin greenish yellow with numerous dots; stalk short, cavity shallow; basin small, furrowed; flesh white, crisp, tender, sub-acid, fair. July and August. Tree vigorous, productive. New Jersey.

Switzer.* Tree vigorous, spreading, very productive; fruit medium, roundish-oblate; skin pale yellow, striped and blushed

with light crimson; very handsome flesh, white, fine grained, juicy, very good. Russian. Valuable for market or culinary.

Tetofski.* Medium, roundish, or oblate conic, handsomely striped with red and covered with a whitish bloom; flesh white, sprightly, sub-acid, pleasant. Tree a moderate grower, very hardy and productive. Valuable for market. July and August. Russian.

Horse. Large, varying from oblate to round, ribbed; yellow; stalk short; cavity and basin shallow; flesh yellow, rather coarse, sub-acid. Tree vigorous, productive, valued at the South and West as a summer cooking and drying apple. North Carolina.

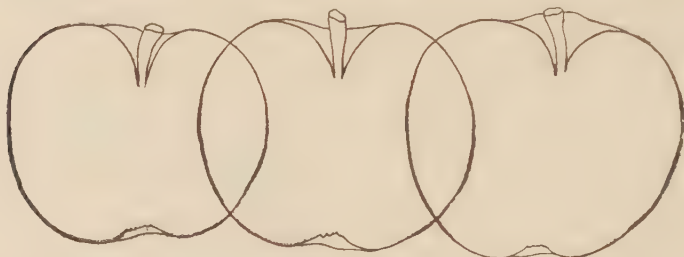


FIG. 366.
Primate.

FIG. 367.
Red Astrachan.

FIG. 368.
Starr.

Kirkbridge White. (Yellow June.) Size medium, oval, tapering to apex and base, equally blunt at ends with broad ribs, smooth; pale yellow; stem short; cavity and basin very narrow; flesh very tender, fine-grained, with a moderately "good" sub-acid flavor. Ripens soon after Early Harvest and for six weeks. Tree a slow grower, but a great and early bearer; valuable at the West. Too tender for long transportation.

Lowland Raspberry. Medium, roundish, conic, clear; waxen, white, shaded and marbled crimson; cavity narrow, acute; stem medium; basin small; flesh snow-white, tinged with pink next the skin; tender, fine-grained, crisp, juicy, sub-acid, almost sweet, quality good. Fig. 397. August. Russian.

Lyman's Large Summer. Large, roundish, flattened at ends; pale yellow; sub-acid, high flavored, rather fine in quality. Ripens at the end of summer. Tree a poor bearer until large. Conn.

Primate.* Above medium in size, roundish-conical, somewhat ribbed; light green, becoming light yellow, often with a slight blush; fine grained, very juicy, with a very agreeable, mild, sub-acid flavor. Ripens for several weeks through the latter part of summer. Often water-cores. Valuable for home use. New York. Fig. 366.

Red Astrachan.* Rather large, sometimes quite large, roundish-oblate, slightly approaching conical, rather smooth; nearly whole surface brilliant deep crimson, with a thick bloom like a plum; stalk one-half to three-fourths of an inch long; calyx in a small slightly uneven basin; flesh white, rather crisp; good, rather acid, slightly austere. A few days after Early Harvest. Excellent for cooking. Shoots stout, dark brown, diverging and ascending; leaves broad. This apple, although of second-rate flavor,

because of its earliness and very handsome and fair appearance, by the vigor and productiveness of the tree, and its excellent culinary qualities, is now in general cultivation. It should be picked a few days before fully mature. Hardy far West. Russian. Fig. 367.

Sine Qua Non. Size medium, roundish, inclining to conical; smooth, pale greenish yellow, shaded with reddish brown to the sun; stalk quite slender, nearly an inch long; basin smooth or very slightly plaited, flesh greenish white, fine grained, delicate, very tender, moderately juicy, of a fine, agreeable, sub-acid flavor. Shoots greenish yellow, growth slow. Ripens two weeks after Early Harvest. Origin, Long Island.

Starr. Large, roundish oblate, regular, smooth; pale green, often with blush on sunny side; flesh yellowish, firm, sub-acid, good. Summer. New Jersey. Fig. 368.

FIG. 369.—Broadwell.

FIG. 370.—Munson's Sweet.

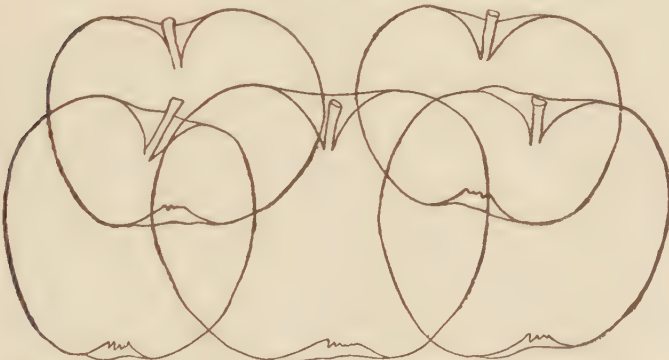


FIG. 371.—Porter.

FIG. 372.—Hawley.

FIG. 373.—Pomeroy.

Summer Pippin. (*Sour Bough.*) Rather large, oblong, oval, irregular; skin pale yellow, with greenish dots and a crimson blush; stalk variable, deep set; basin abrupt, furrowed; flesh white, tender, with a pleasant sub-acid flavor. End of summer. A regular, handsome grower and good bearer. Westchester County, N. Y.

Trenton Early. Size medium, roundish-oblate, ribbed; color yellowish, somewhat marked with green; surface smooth, cavity wide, basin furrowed; flesh light, tender, with a pleasant sub-acid flavor. Late summer. Valued at the West.

White Juneating. (*Yellow May.*) Small, round, sometimes slightly oblate, smooth, very regular; pale greenish yellow, or light yellow; very thin russet round the stalk; stalk slender, three-quarters of an inch long, set shallow; basin very shallow; tender, sub-acid, not rich, becoming dry. Ripens a little before Yellow Harvest. Growth upright, rather stout. Productive. For cooking only. Old English sort.

The **May apple**, of Virginia, is a fruit similar to or identical in character and quality with the **White Juneating**, where it ripens about the first of summer, bearing every year. Large quantities are sent to Baltimore for tarts.

Warfield. Medium, very round; fair, with a light blush; tender, pleasant acid; may be used for cooking in July when two-thirds grown. An excellent late summer market apple. Origin, Muscatine, Ia.

Yellow Transparent.* Medium, round conic; skin yellow,, almost transparent; basin shallow, regular, cavity acute; flesh crisp, sub-acid, good. Largely grown all over the country as an excellent early market apple. Especially valuable for the kitchen. Russia.

DIVISION II.—AUTUMN APPLES.

CLASS I.—SWEET APPLES.

Section I.—Striped with red.

Jersey Sweet.* Size medium, round ovate, often oblong-ovate, somewhat conical; thickly striped with fine red on greenish yellow; stalk one-half to an inch long; cavity rather irregular; basin wrinkled, distinct; flesh whitish, very sweet, juicy and tender, good flavor. Succeeds well in most localities. Early and mid-autumn—immediately follows Golden Sweet. Shoots stout, short jointed; leaves crenate-serrate. New Jersey. Fig. 376.

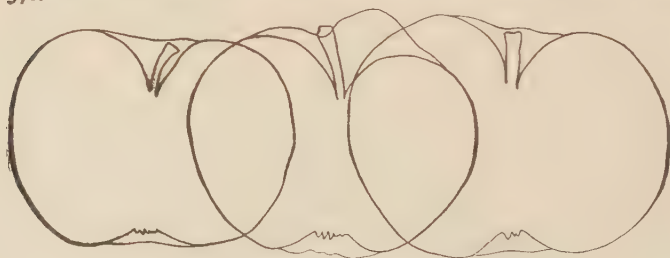


FIG. 374.
Rambo.

FIG. 375.
Prolific Sweeting.

FIG. 376.
Jersey Sweet.

Richmond. Large, roundish-oblato, slightly ribbed; splashed and striped with crimson on yellow ground, with numerous dots; stalk short, cavity large; calyx large, open; basin large, furrowed; flesh white, tender, sweet, rich. Late autumn. Origin, Sandusky, O.

Section II.—Not striped.

Autumn Swaar. (Sweet Swaar.) Large, oblate, sometimes very slightly ribbed; rich yellow; stalk an inch or more long, varying from long and slender, to thick and fleshy at insertion; cavity

and basin wide and slightly ribbed; flesh tender, yellowish, not juicy, with a very sweet, spicy, agreeable flavor. Mid-autumn. Growth vigorous, shoots diverging, tree spreading. A large, roundish-conical apple, with a good, mild, sub-acid flavor, is grown under this name at the West.

Autumn Sweet Bough. (Autumn Bough, Fall Bough, Late Bough, Philadelphia Sweet.) Size medium, conical, angular; pale yellow; stalk slender, deep set; basin deep, furrowed; flesh white, tender, with a very good flavor. Early autumn. Tree vigorous and productive.

Haskell Sweet. Large, oblate, regular; greenish, a warm brown cheek; stalk one-half to three-fourths of an inch long, moderately sunk; basin rather deep, nearly even; flesh tinged with yellowish brown, very tender, sweet, good.

Munson Sweet.* Size medium, oblate, smooth, and regular; pale yellow, with a brown blush; stalk short, in a broad cavity; calyx in small basin; flesh yellowish white, tender, with a very good, sweet flavor. Tree a strong grower and uniform bearer. Last half of autumn. A valuable sweet apple. Mass. Fig. 370.

Prolific Sweet. Medium, oblate conical, base and apex very irregular; smooth yellowish white, lined green; flesh white, firm, juicy, sweet, with clear water spots. Good. September in Vermont. Fig. 375. Russian.

Pumpkin Russet. (Sweet Russet.) Large, round, slightly flattened; yellowish green, partly russeted; cavity wide, shallow; basin small; flavor rich and sweet. Through autumn. Distinct from the Sweet Russet cultivated through western New York, which is a more conical fruit. Connecticut.

Pumpkin Sweet. (Lyman's.) Very large, roundish, ribbed most toward the stalk; pale green; stalk short; calyx small, basin abrupt; flesh white, sweet, tender, not juicy, of moderate quality. Ripens through autumn, into winter. A valuable culinary sort. Connecticut.

Stump.* Fruit medium, oblong-conic; yellow, striped bright red; sub-acid, very crisp, excellent. Resembles Chenango. Remarkably prolific. A very desirable home or market variety. Monroe County, N. Y.

Summer Sweet Paradise. Large, roundish, sometimes remotely oblong, and slightly flattened at the ends, regular; pale green; stalk rather thick, three-quarters of an inch long; basin large, distinct; flesh tender, sweet, rich, aromatic. Ripens first of autumn. Shoots spreading, leaves sharply serrate. Origin, Pennsylvania.

This is totally distinct from the Dwarf Paradise, used for stocks, which bears a small, poor, sweet, summer fruit.

Sweet Longfield. Large, regular, oblong-conic; truncated greenish yellow, usually blushed on sunny side; cavity regular, acute; stem medium; basin small and abrupt; flesh white, fine-grained, rich, very sweet, quality good. Late autumn. Fig. 381. Russian.

Sweet Pepka. Small, oblong-conic, angular; yellowish white; cavity regular, narrow; stem short; basin wide, shallow, wrinkled; flesh white, juicy, fine-grained, sweet, quality fair. Autumn. Fig. 356. Russian.

Tift Sweet. Medium in size, flat; greenish yellow with russet network and a warm, light brown cheek; stalk one inch long; cavity wide, obtuse; flesh yellowish, rich, sweet, fine in flavor. A light bearer. New England.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section 1.—Striped with red.

Alexander. Very large, oblate, inclined to conic, regular; streaked with bright red on greenish-yellow; stalk small, cavity rather deep; calyx large, basin deep, even; flesh rather crisp, sub-acid, good; a coarse sort, only for cooking. A moderate or poor bearer. Late autumn. Very showy, its chief recommendation. Russian.

Beauty of Kent. Very large, rounding, somewhat flattish-conical, fair, smooth, and rather obtuse; nearly the whole surface striped with rich purplish red; stalk three-fourths to an inch and a half long, slender; cavity acuminate; calyx small, basin deep, narrow; flesh tender, slightly sub-acid, of rather poor flavor. One of the most beautiful and magnificent in appearance of all apples, but of little or no value, except for cooking. Late autumn. Growth strong and upright, shoots dark. English.

Bonum. Large, oblate; red; basin cavity shallow; stem medium length; flesh yellow, sub-acid, rich, delicious. An early and abundant bearer. North Carolina.

Buckingham.* (Bachelor, Equinately, Fall Queen of Kentucky, Kentucky Queen.) Medium to large, oblate, inclining to conic; striped, shaded and splashed with crimson on greenish yellow, with many light brown dots; cavity large; stalk short; basin wide and deep, somewhat furrowed; flesh yellowish, tender, breaking, mild sub-acid, very good in quality. Late autumn and early winter. A popular and profitable sort in the southwestern States. Tree hardy and healthy, and moderately productive, forming a round-headed top. Virginia. Fig. 383.

Carnation. W. N. White, of Georgia, gives the following description of this apple: Medium size; a delicious, sub-acid apple, fully first rate; dark red, splashed with russet; flesh white, brittle, and very juicy; both stalk and calyx are sunk in deep depressions; no autumn apple is superior. Ripe August 10th.

Chenango Strawberry.* (Frank, Buckley, Jackson, Sherwood's Favorite, Strawberry.) Rather large, oblong-conic, angular, striped and splashed with light crimson on whitish yellow ground; cavity narrow and deep; basin narrow; flesh white, very tender, with a pleasant, mild, sub-acid flavor. September, October. Growth upright, vigorous, shoots light colored. Origin, Chenango County, N. Y. An excellent dessert or market variety.

Clyde Beauty. Large, roundish-conical, slightly ribbed; striped and mottled red on greenish yellow; stem short, slender, deep set; basin furrowed; flesh white, fine-grained, sub-acid, fair. Late autumn. Wayne County, N. Y.

Cooper. Rather large, round oblate, sides unequal; greenish yellow and pale red; stalk slender, deep set; basin deep; flesh crisp, juicy, pleasant, but not very high flavor. Mid-autumn. Cultivated in Central Ohio.

Cornell. (Cornell's Fancy.) Medium, oblong conic; shaded and splashed red on yellow; stalk medium, cavity large; basin abrupt, furrowed; flesh white, tender, with a pleasant sub-acid flavor. September. Originated and valued in central Pennsylvania.

FIG. 378.
Red Summer Calville.

FIG. 380.
Lubsk Queen.



FIG. 379.
Basil the Great.

FIG. 377.
Longfield.

FIG. 381.
Sweet Longfield.

Doctor. (De Witt.) Medium in size, or large; regular, oblate; yellow, clouded and streaked with red; stalk and calyx deep set; flesh breaking, tender, aromatic, brisk, fine flavor. Late autumn and early winter. Succeeds well in Pennsylvania and Ohio; less esteemed farther north. Origin, Pennsylvania.

Fairbanks. Size medium, rather oblate, inclining to conic; skin light yellow, striped with red, with patches of russet; stem long, set in a broad and shallow cavity; flesh yellowish, juicy, with a rich sub-acid and vinous flavor. September and October. Origin, Winthrop, Me.

Fall Seek-no-further. Very large, oblate; shaded and striped with red on yellow; stalk long; cavity large, russeted; basin broad, uneven; flesh whitish, tender, pleasant, sub-acid. Productive. Connecticut.

Fall Wine.* Medium to large, roundish-oblate; color a rich red, faintly striped on a rich yellow skin; stem slender; flesh yellow, crisp, tender, juicy, with a mild, rich, scarcely sub-acid flavor. Mid-autumn till winter. Fig. 382. Succeeds best in the West—often scabby at the East.

Fameuse.* (Snow-apple, Pomme de Neige.) Medium in size, round, often oblate, even; handsomely striped and blotched with fine deep red on whitish ground—where much exposed, a deep, nearly uniform red; stalk three-fourths of an inch long, slender, cavity small; basin quite small, slightly wrinkled; flesh very white, juicy, sub-acid, a little spicy, exceedingly pleasant, but not very rich. Late autumn. Shoots dark, diverging, somewhat flexuous. Much admired as a table fruit for its handsome appearance and pleasant, refreshing flavor. Fig. 388.

Gabriel. Size medium, roundish-ovate, regular; striped and splashed with pale red on yellow; stalk slender; calyx and basin small; flesh yellowish, sub-acid, of excellent flavor.

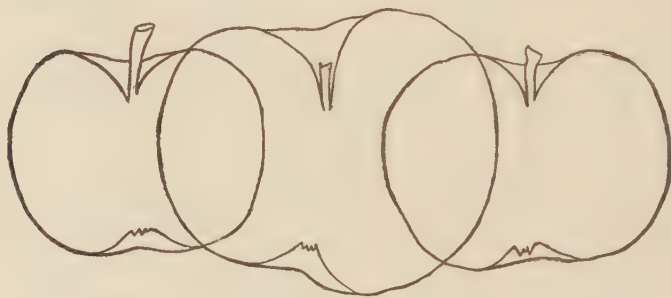


FIG. 382.
Fall Wine.

FIG. 383.
Buckingham.

FIG. 384.
Soulard.

Gravenstein.* Rather large, roundish, slightly oblate, obtusely and obscurely ribbed, surface a little wavy; striped and splashed with bright red on a yellow ground; stalk three-quarters of an inch long; cavity rather deep; calyx large; basin deep, narrow; flesh tender, juicy, very rich, sub-acid or rather acid, high flavored. Mid-autumn. Productive, handsome, and excellent. Fine in all localities. Shoots strong, becoming smooth and shining, ascending. Fig. 391. German.

Hurlbut. Size medium, oblate, conic; yellow striped with red; stalk small; cavity large; basin shallow; flesh white, crisp, tender, with a mild sub-acid flavor. Connecticut.

Jefferson County. Medium, roundish, regular; striped and shaded red on yellow; cavity deep; calyx small; basin deep, smooth; flesh crisp, tender, with a very good mild sub-acid flavor. Late autumn. Tree vigorous, productive. Jefferson County, N. Y.

Jefferis. Medium or rather large, round oblate; yellow, red, and deep red, striped; stalk very short, slender; cavity and basin

deep; flesh yellowish white, remarkably tender and juicy; flavor very pleasant. Ripens first of autumn. Fig. 390. Origin, West-Chester, Pa. Hardy far north.

Jewett's Red. (Jewett's Fine Red, Nodhead.) Medium or rather large, roundish, slightly oblate; striped red on yellow or slightly greenish yellow ground, with conspicuous white dots; stem nearly an inch long; cavity acuminate; basin rather shallow; flesh remarkably tender, fine grained, mild sub-acid, slightly aromatic. Mid-autumn into winter. Cultivated in the northern parts of New England. Hardy at the West. New Hampshire.

FIG. 386.—Late Strawberry.

FIG. 388.—Fameuse.

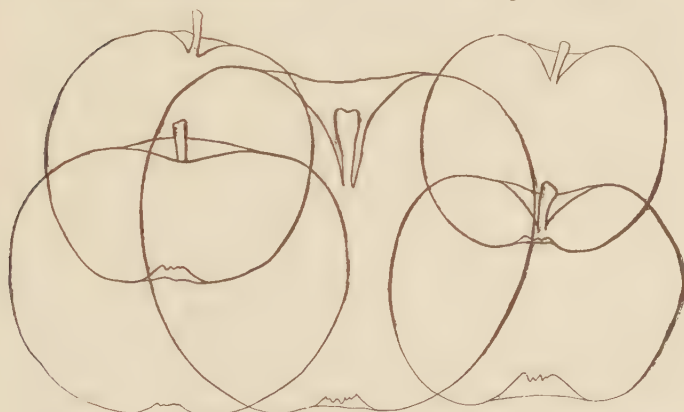


FIG. 387.—Oldenburg.

FIG. 385.—Twenty Ounce.

FIG. 389.—Melon.

Kane. (Cane, Cain.) Size medium, roundish-oblately, often obscurely conical, regular; surface fair and beautiful, highly polished, indistinctly striped with brilliant light crimson, gradually merging into delicate blush color on the shaded part; stalk often very short; cavity acute, narrow; basin regular; flesh yellowish white, with a pleasant, good flavor. Hardly of the highest quality, but much admired for its beauty. Late autumn. A native of Kent County, Delaware.

Late Strawberry.* (Strawberry, Autumn Strawberry.) Size medium; roundish, slightly conical, sometimes faintly ribbed; nearly whole surface with small broken streaks of light and dark red; stalk slender, about an inch long; basin ribbed, flesh yellowish white, slightly fibrous, very tender and juicy, with a fine, very agreeable, sub-acid flavor. Young trees of remarkably thrifty growth, leaves sharply serrate, which at once distinguishes them from the crenate leaves of the Early Strawberry. Ripens early in autumn, and often keeps till winter. Very productive. Fig. 386. One of the best early autumn apples. Succeeds well in the West. New York.

Leland Spice. (Leland Pippin.) Large, roundish, obscurely conical, slightly ribbed; whole surface with brilliant red streaks on yellow ground, dotted with yellow; stalk half an inch long; cavity and basin ribbed; flesh yellowish white, sub-acid, spicy, rich, fine. October. Origin, Sherburne, Mass.

Long Island Seek-no-further. Large, oblate, conical; skin yellow, striped and splashed with red; flesh tender, with a good sub-acid flavor. October to February. An old variety. Tree productive. Origin unknown.

Lyscom. Large, round, with broad, broken, distinct, pale red stripes, on yellowish or greenish yellow ground; stalk three-fourths of an inch long, slender; calyx deep set; flesh fine grained, mild, slightly sub-acid, moderately rich, good flavor. Middle and late autumn. Massachusetts.

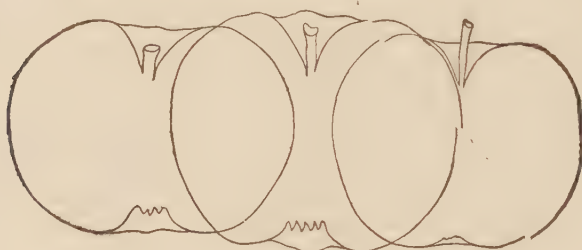


FIG. 390.
Jefferis.

FIG. 391.
Gravenstein.

FIG. 392.
Sops of Wine.

Magnolia. Size medium, oblate-conical; striped and mottled with crimson on yellow; stalk short; cavity broad, uneven; basin small; flesh white, tender, with a brisk aromatic flavor. Growth moderate, productive. Mid-autumn.

Mangum. (Gulley.) Medium, oblate, slightly conic, ribbed; shaded and striped with red on yellow with numerous dots; stalk small, in a broad, russeted cavity; basins lightly furrowed; flesh yellow, very tender, with a mild sub-acid excellent flavor. A valuable Southern apple. Tree thrifty, productive. Alabama.

Melon.* (Watermelon, Norton's Melon.) Medium or large, roundish, often slightly conical, frequently a little irregular; color, with stripes and dots of bright red on yellow ground, or clear red on pale yellow; stalk an inch long, slender; cavity acuminate; basin deep; flesh white, tender, very juicy, fresh, and pleasant, spicy, sub-acid or slightly sub-acid, fine flavored. Growth rather slow. Late autumn and early winter, but often keeps longer. Fig. 389. An excellent table apple, but a moderate bearer. Origin, East Bloomfield, N. Y.

Melt in the Mouth. Medium or rather small, roundish, slightly flattened; skin greenish yellow, indistinctly striped and shaded with red, with russet dots; stalk short; cavity shallow, obtuse; calyx open; flesh yellow, with a rich, aromatic, rather acid, and very good flavor. Ripens through autumn. Pennsylvania.

Mexico. Size medium, roundish; striped light and dark red; stalk large and long; cavity broad, shallow, russeted; calyx large, in a narrow basin; flesh whitish stained with red, tender, with a very good flavor. A handsome New England fruit. Tree very hardy, productive.

Myer's. (Ohio Nonpareil.) Large, roundish, slightly oblate; marbled and splashed red on yellow; cavity and basin medium; flesh yellowish white, with an excellent sub-acid flavor. Autumn. Growth strong and straight, forming a compact head. Productive, and much valued at the West.

Oldenburgh.* Medium or rather large, roundish, a little flattened at the ends; light red in broad broken stripes and splashes on yellow ground; stem short, in an acuminate cavity; basin deep and narrow; flesh yellowish white, sub-acid, very handsome. Good for cooking. Early autumn. Shoots dark, ascending. Very hardy. Succeeds well at the West and North. The strong growth of the tree, its early bearing and endurance of severe winters, and the fair and handsome appearance of the fruit, render it one of the most valuable sorts for the West. Russian. Fig. 387.

Orndorf. Size medium, roundish; slightly striped and shaded red on yellow; stalk slender; cavity and basin deep; calyx open; flesh yellowish, crisp, with an excellent sub-acid flavor. A moderate bearer. October and November. Ohio.

Rambo.* (Romanite of New Jersey.) Size medium, oblate, smooth; streaked and marbled with dull yellowish red on pale yellowish ground; dots large; whitish; stalk an inch long, rather slender; basin broad, slightly plaited; flesh tender, rich, mild sub-acid, fine flavored, often excellent. Fine in nearly all localities. Late autumn and early winter. Known by the erroneous name of Seek-no-further in Philadelphia market. Pa. Fig. 374. Tender far West.

Red Summer Calville. Medium, regular, oblong-conical; yellowish white, mostly covered with rosy red, mottled and splashed with darker red, basin very shallow, almost wanting; flesh white, fine grained, spicy, sub-acid, quality good. Early autumn. Fig. 378. Russian.

Republican Pippin. Large, round-oblate; striped with red on a mottled reddish ground, greenish yellow in the shade; stalk an inch long, slender; cavity sometimes with radiating russet rays; flesh tender, sub-acid, with a pleasant, peculiar, somewhat walnut flavor. Ripens early and mid-autumn, but is a good cooking apple in summer. Excellent for drying. Tree a strong and crooked grower—moderate bearer. Origin, Lycoming County, Pa.

Ribston Pippin. Medium or rather large, roundish conical; clouded and striped with yellowish red, on a yellow and slightly russeted ground; stalk slender, often short; cavity rather wide; basin narrow, angular; flesh yellow, crisp, granular, juicy, with a very rich and rather sharp or acid flavor. First-rate as far north as Maine, often second-rate farther south; but its quality is usually suffered to deteriorate needlessly by remaining too long on the tree. Late autumn and early winter. Shoots diverging or spreading; buds and young shoots rather hoary. English.

Richards' Graft. (Derrick's Graft, Red Spitzenburgh.) Rather large, roundish-oblate; striped red on yellow; cavity large; basin deep; flesh fine grained, tender, with a refreshing, sub-acid, very good flavor. September and October. Cultivated on the Hudson River.

Shiawasse Beauty. Medium, oblate, regular, smooth; deep brilliant red on greenish yellow ground; stalk very short, deeply sunk; basin small, regular; flesh white, tender, crisp, sub-acid and aromatic. October and November. Resembles Fameuse, but tree a stronger and more upright grower and fruit larger. Michigan.

Smokehouse.* Medium or rather large, oblate, regular; mottled, and indistinctly striped with red on yellow ground; a slight greenish cast at the crown; stalk one inch long, slender, cavity wide, acute; basin rather distinct; flesh yellowish white, rich, aromatic, fine sub-acid flavor. Mid-autumn to winter. Origin, Chester County, Pa. Succeeds in the Middle States.

St. Lawrence. (Corse's St. Lawrence.) Large, roundish, slightly oblate, and sometimes a little conical, obtuse; whole surface broadly and very distinctly striped with very dark red, on light greenish yellow ground; stem rather short and slender, cavity wide; basin round, deep, with a very obtuse rim; flavor rather acid, moderately rich, agreeable. A very handsome, hardy, and productive apple, of good flavor, ripening about mid-autumn. Canadian.

Soulard. Medium, round oblate, slightly angular; whitish, striped bright red, dots few, brown; stalk short, cavity large; basin medium, corrugated; flesh white, tender, juicy, sub-acid. Very good. Late autumn. Fig. 384. Missouri.

Titus. Large, round; greenish yellow, striped with red; cavity deep, stem medium; basin wide, shallow; flesh fine-grained, juicy, sub-acid, the best of the Titus family of Russian apples. Late autumn. Fig. 434. Russian.

Twenty Ounce.* (Cayuga Red Streak, Twenty Ounce Pippin erroneously.) Very large, roundish, remotely conical; surface sometimes smooth, often very wavy; color striped rich yellowish red on greenish yellow or yellowish white ground; stalk three-fourths inch long; sub-acid, rather coarse, second quality. Very showy, fair, and productive. Fig. 385. A profitable market sort. Late autumn and early winter. Growth in large trees becoming straggling. Connecticut. The Twenty Ounce Pippin is a large, green, third-rate fruit.

Vandevere. (Watson's Vandevere, Indiana Vandevere.) Large, oblate, remotely conic; striped and blotched with light red on yellow; stalk short, cavity large; flesh greenish yellow, firm, crisp, brisk sub-acid. Culinary. Western. November and December. Delaware.

Washington Strawberry. Rather large, roundish-conic, slightly oblate; striped and splashed with deep crimson on yellow; cavity deep; flesh yellow, a little coarse, brisk sub-acid. Growth vigorous. September, October. Origin, Washington County, N. Y.

Winter Pear. Rather small; yellow striped, splashed and marbled with red; cavity rather deep; stem medium, basin narrow, regular; flesh yellowish, fine-grained, juicy, very spicy, mild sub-acid with a decided pear flavor. Early autumn. Fig. 393. Russian.

Section II.—Not Striped.

Bailey Spice. Fruit medium, roundish-conic; light yellow with a faint blush; stalk large, deeply set; calyx closed, basin moderate; flesh fine-grained, tender, spicy, rich, sub-acid. Mid-autumn. Origin, Plattsburgh, N. Y.

Bellerdovskoe. Large, round, regular, smooth; greenish yellow, bronzed in the sun; cavity regular, acute; stem short, basin wide, shallow; flesh white, juicy, sub-acid, good. Early autumn. Fig. 396. Russian.

FIG. 393.—Winter Pear. FIG. 394.—Raspberry.

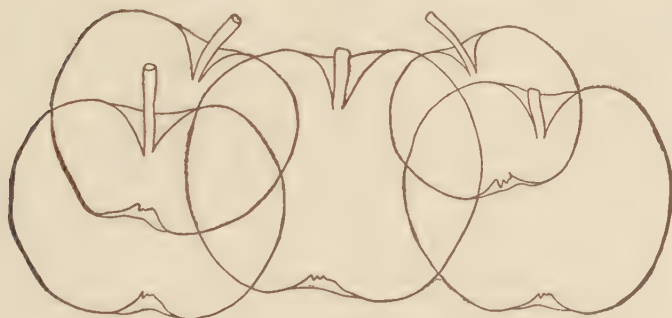


FIG. 395.
Blushed Calville.

FIG. 396.
Bellerdovskoe.

FIG. 397.
Liveland Raspberry.

Bietigheimer. (Red Bietigheimer.) Very large, round, oblate; dark yellow, covered with purplish crimson; flesh firm, sub-acid, good. Tree a vigorous grower and free bearer, hardy. German.

Blushed Calville. Medium, roundish oblate; yellow, blushed on side; cavity large, oblique; basin narrow, corrugated; flesh reddish white, fine-grained, sub-acid, quality good. Season August, following Yellow Transparent. Fig. 395. Russian.

Capron's Pleasant. Rather large, roundish-oblate; greenish yellow; stem rather stout; calyx large; cavity and basin medium; flesh yellow, tender, mild, sub-acid, agreeable. September and October.

Cracking. Large, roundish; light yellow, with a tinge of red in the sun; stalk slender, in a deep, narrow, acuminate cavity; basin deep and narrow; flesh a little coarse, yellow, with a pleasant breaking texture, and a good sub-acid flavor. Valuable at the West. Ohio.

Disharoon. Rather large, roundish-oblate, slightly conical; yellowish green; stalk short, cavity large, calyx small; basin rather deep and narrow; flesh white, with a fine sub-acid, aromatic flavor, resembling that of Newtown Pippin. November, December. Georgia.

Drap d'Or or "**Cloth of Gold.**" Large, roundish, sometimes slightly oblong-conical, more frequently rather oblate; bright yellow, with numerous black specks; stalk short; basin shallow, plaited; sub-acid, mild, agreeable. Early autumn, extending to mid-autumn. Tree regular, spreading; leaves doubly serrate.

Duckett. Rather large, roundish-oblate; light greenish yellow, slightly ribbed; stalk short, deep set; basin deep; flesh fine-grained, mild, sub-acid. Late autumn. A good southern fruit.

Dyer.* (*Pomme Royal*, which is the original name.) Rather large, roundish, often approaching round oblong, sometimes slightly flattened, obscurely ribbed; light yellow, rarely a faint brown cheek, and sometimes a slight russet network over the skin; stalk three-fourths to one inch long; basin often deep and large, ribbed; flesh very fine-grained, tender, very juicy, with a rich, sub-acid, or rather acid, excellent flavor, having but few equals. Fig. 365. Season variable; November, December. Productiveness variable. An early bearer.

Ernst's Pippin. Large, oblate, smooth; pale greenish yellow, with a brownish cheek; cavity wide, basin wrinkled, calyx open; flesh tender, sub-acid, very agreeable. Mid-autumn. Cincinnati.

Esten. Large, oblong-ovate, slightly ribbed, smooth; yellow, sometimes a blush; dots large, green and red; stalk one inch long, slender; cavity very deep; basin shallow; flesh white, fine-grained, mild sub-acid. Tree vigorous, very productive. Rhode Island.

Fall Harvey. Large, roundish-oblate, nearly regular; pale yellow; stalk slender, one inch long; cavity moderate; basin medium in size, furrowed; flesh fine-grained, juicy, good, mild sub-acid flavor. Moderate or poor bearer. Essex County, Mass.

Fall Orange.* (*Holden Pippin*.) Large, roundish-ovate, or oval; light greenish yellow, becoming pale yellow, rarely a brown cheek; stalk half an inch long, cavity narrow; basin even-rimmed, slightly plaited; sub-acid, tender, good, best when fresh from the tree. Shoots very stout, dark colored. Tree very hardy, bears while very young, fruit always fair. Massachusetts.

Fall Pippin.* (*Holland Pippin*, erroneously.) Very large, roundish, obtuse, somewhat oblong-conical, a little flattened at the ends, sometimes with large obtuse ribs; color greenish, becoming a high rich yellow when ripe, with some large shades of green about the crown before fully ripe; stalk large, in an acuminate cavity, basin deep; flesh yellowish, rather firm, becoming tender, rich, aromatic, excellent. Leaves sharply serrate, shoots vigorous, rather dark, diverging, becoming spreading; tree large. Late autumn, keeping into mid-winter. Mostly a moderate bearer—fruit sometimes water-cored. Excellent for cooking. Fine in nearly all localities. Fig. 368.

Hawley. (Dowse.) Quite large, roundish, slightly conical, sometimes nearly round, with a broad obtuse apex, and slightly flattened, smooth; pale green becoming yellow, sometimes a very faint orange cheek; stalk one-half to one inch long, slender; cavity wide, deep, acute, sometimes slightly obtuse; basin deep, slightly furrowed; flesh yellowish white, fine-grained, quite tender, with a mild, rich, sub-acid, fine flavor. Ripens at mid-autumn. Shoots of rather slow growth. Origin, Columbia County, N. Y. Liability to dry rot and water-core has rendered it of little value. Fig. 372.

Holland Pippin. Very large, roundish, somewhat oblong, and flattened at the ends, sometimes slightly oblate; greenish yellow, becoming pale yellow or whitish yellow, with a brownish red cheek; stalk variable in length, usually short; cavity wide, acute; basin slightly plaited; flesh nearly white, rather acid, with a moderate flavor. Ripens early and mid-autumn, but is a good cooking apple some weeks previously. Wholly distinct from the Fall Pippin. An excellent culinary sort.

Hunge. Rather large, roundish, somewhat irregular and oblique; skin smooth, bright yellow, with a faint delicate blush; stem half an inch long; basin rather deep, slightly ribbed; flesh fine-grained, tender, sub-acid, "very good." Cultivated in North Carolina. September and October.

Keswick Codlin.* Rather large, somewhat conical, and ribbed; greenish yellow, becoming light yellow; stalk short, deep set; calyx rather large; juicy, pleasant acid, quality moderate. Succeeds well at the West. Fine for cooking; very productive, bears early. Ripens in September but may be used for cooking in summer. English.

Lowell.* (Orange, Tallow Apple, Tallow Pippin, Queen Anne, of Northern Ohio.) Large, roundish-oblong, obtuse, slightly conical; green, becoming rich yellow; surfaces lightly oily; stalk one inch long; basin deep, furrowed or plaited inside, rim obtuse, even; flesh yellowish white, rather coarse, rich sub-acid, or rather acid; hardly first quality, but valuable for its fair surface and great and early productiveness. Early autumn. Tree rather slender and a moderate grower.

Maiden's Blush.* Rather large, oblate, smooth, and regular; with a fine, evenly shaded red cheek or blush on a clear pale yellow ground; stalk short; cavity rather wide; basin moderate, even; flesh white, fine-grained, tender, pleasant sub-acid, but not rich. Mid-autumn. Tree spreading. Although deficient in richness, it is valued for its fair, tender, and beautiful fruit, and uniform productiveness. Fig. 400. Valuable at the West. New Jersey.

Porter.* Above medium, oblong-ovate-conical, regular, often ribbed at apex; bright yellow, sometimes a dull blush in the sun; stalk one inch long, slender, cavity rather small; basin narrow; flesh tender, rich, rather acid, of fine flavor. Fair and productive. Early autumn. Succeeds in the Northern and Middle States. Leaves sharp, serrate. In some localities this fruit proves too acid for the table. Fig. 371. Massachusetts.

Roberson's White. Medium, oblong, flattened at ends; green, with dark dots; flesh yellowish, fine-grained, crisp, with a sub-acid, aromatic flavor. Late autumn. Tree vigorous, upright. A good bearer. Formerly grown in Maryland and Virginia.

Oliver. Medium, red on greenish yellow ground, with grayish dots; flesh yellowish white, stained with pink, crisp, sprightly, sub-acid. Arkansas.

Star. Medium, flat, slightly conical, unequal, regular, smooth; greenish yellow; dots numerous, dark, prominent; basin shallow, regular, eye small, closed, cavity shallow, regular, russeted; stem short; flesh white, tender, juicy, sub-acid, rich.

FIG. 398.—Dyer.

FIG. 399.—Am. Golden Russet.

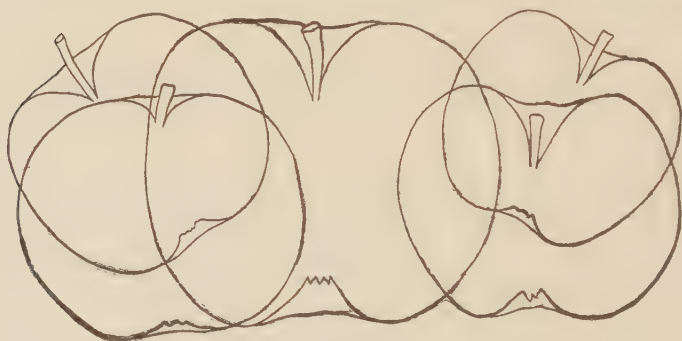
FIG. 400.
Maiden's Blush.

FIG. 401.

Fall Pippin.

FIG. 402.
Monmouth Pippin.

Stevenson's Winter. Medium, roundish oblate; greenish yellow and dark red; vigorous and prolific. Autumn. Alabama.

Wealthy. Medium, roundish, oblate; yellowish shade with dark red, oily; flesh tender, white, juicy, sub-acid, very good. Tree hardy, vigorous and productive. A standard commercial variety in the plains region, and valued as an excellent culinary and market sort elsewhere. Minnesota. Fig. 469.

Winthrop Greening. Large, oblate, remotely conical, slightly ribbed, nearly regular; skin yellow, when ripe, with a little green, sometimes a faint red shade to the sun; stem short, cavity shallow, basin moderate; flesh yellowish white, sub-acid, very good. Mid-autumn. A valued sort in Maine.

DIVISION III.—WINTER APPLES.

CLASS I—SWEET APPLES.

Section I.—Striped with red.

Bailey Sweet.* (Patterson Sweet, Edgerly Sweet.) Large, regular ovate, often slightly and sometimes considerably ribbed; the whole surface frequently a full bright red, in small, broken, indistinct stripes and dots, on light ground; stalk slender, one inch long; cavity small, narrow, slightly ribbed; basin small, plaited; flesh very tender, not juicy; flavor mild, rich, sweet; fine. Early winter. Fig. 404. Origin, Perry, Wyoming Co., N. Y.

Bentley's Sweet. Rather large, roundish-oblong, striped and blotched with red on yellow ground; stalk in a deep, narrow cavity, calyx large, open; basin deep; flesh rather coarse, firm, of moderate quality. Keeps long. Virginia.

Hartford Sweet. (Spencer Sweeting.) Rather large, roundish, slightly flattened; striped with fine red on greenish yellow ground; stalk slender, cavity rather shallow, round; calyx large, basin shallow; juicy, tender, rich, agreeable. Keeps through winter and spring. Productive. Although hardly first-rate in quality, valuable for its productiveness and long keeping. A native of Hartford, Conn.

Hockett's Sweet. Large, roundish oblate, smooth; lightly shaded and obscurely striped with light dull red on a dull rich, yellow skin; flesh yellowish, coarse grained, somewhat crisp, compact, with a very sweet and rather rich flavor. Early winter. North Carolina.

Ladies' Sweet.* Medium, roundish-ovate, apex narrow; striped with red on pale yellow ground, a nearly uniform shade of fine red to the sun; faintly marbled or clouded with white over the red, and cavity faintly rayed with white; stalk short, cavity small; calyx and basin small; tender, juicy, agreeable, fine. One of the best winter sweet apples. A profuse bearer. Growth feeble. Fig. 403. Newburgh, N. Y.

Maverack's Sweet. Large, roundish-oblate, approaching conical; striped and shaded with bright red on yellow skin; stalk short, cavity rather large; calyx open; flesh fine-grained, tender, of sweet, very good flavor. Early winter. South Carolina.

Phillips' Sweet. Medium or large, roundish, slightly flattened and conical, regular; mottled red, yellow, and dark red; flesh rich yellow, tender, juicy, crisp, sweet. Very handsome; resembles Ladies' Sweeting, but more showy and not equal in flavor. Early winter. Growth upright, vigorous. Central Ohio.

Ramsdell's Sweet. (Ramsdell's Red Pumpkin Sweet.) Rather large, oblong, obscurely conical, regular; dark rich red, with a blue bloom; stalk short; basin rather deep, even; flesh yellowish, tender, sweet, rich, good second quality. Tree vigorous, upright, productive. Late autumn and early winter. Connecticut.

Sweet Pearmain. (Henrick Sweet.) Medium size, roundish or ovate-conical; dark rich red, with rough dots; stalk an inch long, slender, cavity wide, round; calyx woolly, basin very small; flavor sweet and rich. Through winter. Introduced from England before the Revolution. Much valued in central Ohio and farther West.

Sweet Romanite. (Sweet Nonsuch, of Illinois.) Size medium, roundish oblate, regular; striped and shaded with bright red on greenish yellow; stalk short; calyx large, open; basin shallow, furrowed; flesh greenish yellow, firm, crisp, juicy, sweet. Keeps through winter. Fig. 405. Valuable at the West.



FIG. 403.
Ladies' Sweeting.

FIG. 404.
Bailey's Sweet.

FIG. 405.
Sweet Romanite.

Sweet Vandevere. (Sweet Redstreak, Sweet Harvey.) Size medium, oblong, slightly conical; shaded and striped dull red on greenish yellow; stalk small, cavity large, irregular; basin wide; flesh tender, juicy, with a rich aromatic flavor. Growth crooked, a profuse bearer. Through winter.

Wing Sweet. Medium, roundish, slightly oblong, ribbed; color bright red in small stripes and shades on yellow skin; stalk slender, basin and apex very sharply ribbed; flesh whitish yellow, sweet, good. A good bearer, and when well grown on strong soil, a handsome and fine sweet winter apple.

Section II.—Not Striped.

Broadwell.* Rather large, slightly conical, somewhat oblate; skin thin, smooth, greenish yellow; stalk short, small, deep set; flesh white, tender, sweet, juicy, fine—and one of the best winter sweet apples. Keeps through winter late into spring. Ohio. Fig. 369.

Camak Sweet. Size medium, roundish-conical; light green with a warm cheek; stem short or long, cavity narrow; calyx open, basin deep; flesh firm, sweet, very good. North Carolina.

Danvers Winter Sweet.* Medium or rather large, roundish, remotely oblong or conical, obscurely ribbed; greenish yellow, becoming a rather dull rich yellow, sometimes an orange blush; stalk three-quarters to one inch long, cavity acute; basin smooth, narrow; flesh yellow, sweet, rich. Fig. 408. Growth vigorous, tree productive. Massachusetts.

Green Sweet.* Large or medium, nearly round, slightly approaching ovate-conical, regular; surface green, with greenish white dots; stalk about an inch long, moderately thick, cavity rather small and narrow, round, acuminate; basin small, slightly furrowed; flesh greenish white, with a very sweet, spicy, good flavor. Fair, productive, and a long keeper. Fig. 407. Massachusetts.

Higby's Sweet. Size medium, roundish, slightly oblate; pale yellow; stalk short; basin deep, slightly furrowed; flesh white, tender, with a good, sweet flavor. Early winter. Northeastern Ohio.

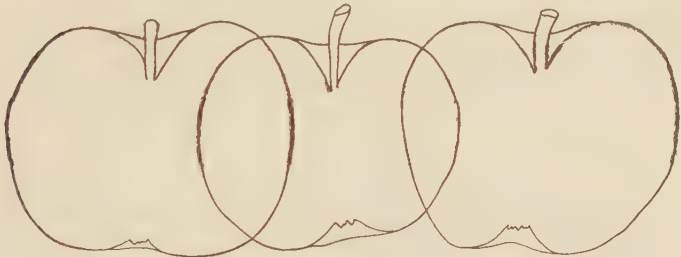


FIG. 406.
Tallman Sweet.

FIG. 407.
Green Sweet.

FIG. 408.
Danvers Winter Sweet.

Honey Greening. Large, oblong, oval; greenish yellow with green and gray dots; stalk long, slender, deeply set; basin broad, deep; flesh tender, mild, sweet, slightly aromatic. Grown at the West. Tree vigorous, upright, an early and constant bearer. November and December.

Jacobs Sweet.* Tree vigorous, spreading; fruit medium to large, roundish-oblate; light yellow with numerous large greenish dots, occasionally blushed; flesh white, crisp, somewhat coarse, but good. November to late winter. An excellent winter sweet. Medford, Mass.

Leicester Sweet. (Potter Sweet.) Rather large, oblate; greenish yellow and dull red; tender, rich, excellent, fine for dessert or baking. Winter. Tree vigorous, not very productive. Origin, Leicester, Mass.

London Sweet. (Heicke's Winter Sweet.) Rather large, oblate; pale yellow; stalk very short, deeply set; basin abrupt; flesh whitish, tender, with a fine, sweet, aromatic flavor. Early winter. Tree upright, a good annual bearer.

Tolman Sweet.* Medium or rather large, roundish-oblate slightly conical; clear light yellow, with a clear brownish line from stalk to apex; stalk nearly an inch long; calyx in a distinct, slightly

wrinkled basin; flesh white, firm, rich, very sweet. Excellent for winter baking. Keeps into spring. Young tree vigorous, upright, shoots becoming spreading; leaves wavy. Fig. 406. Productive. Hardy. Rhode Island.

Wells Sweet. Medium in size, roundish, tapering slightly to base and apex; color light green, with a brownish cheek; stalk short; basin shallow; flesh very white, tender, rich, agreeable. Early winter. Newburg, N. Y.

Winter Sweet Paradise. Rather large, roundish; skin pale greenish yellow with a brown blush; stalk short; calyx and basin small, flesh white, with a sweet, "very good" flavor. Ripens through winter. Origin, Pennsylvania. Succeeds well at the West.

CLASS II.—WITH MORE OR LESS ACIDITY.

Section 1.—Striped with Red.

Ailes. Large, oblate; striped and shaded red on yellow; stalk short, cavity narrow, basin medium; flesh yellow, crisp, firm, with a rich, sub-acid, "very good" flavor. Keeps through spring. Chester County, Pa.

Anis. Small, oblate conical, ribbed; yellow, nearly covered with dark crimson in strips and splashes; cavity deep, stem short, stout; basin wide, shallow; flesh firm, fine grained, sub-acid, aromatic; quality best when properly ripened. This apple belongs to a family grown on the upper Volga in Russia, on a large scale, all of which are valuable for cultivation in the northern limits of fruit culture. Fig. 432. Russian.

Anisovka. Large, oblate; yellowish, striped and splashed with red; flesh yellowish white, juicy, sub-acid; cavity large, stem medium, basin wide, deep. This belongs to the Oldenburg family and resembles the Oldenburg in the tree and in the size, shape, and markings of the fruit. It has also proven hardy in the Northwest. Fig. 451. Russian.

Arkansas Black. Medium, slightly conical, regular, smooth, glossy; yellow, generally covered with deep crimson, small light-colored dots; basin shallow; eye small, closed; cavity shallow, russeted; stem medium; flesh very yellow, fine-grained, firm, juicy, sub-acid, rich, very good. Late winter. Arkansas. Fig. 477.

Babbitt. Large, oblate conical, angular, smooth; greenish white, shaded and striped with red, dots light, few; cavity large, deep, regular; stem short; basin medium, regular, furrowed; calyx shallow; eye small, closed; flesh yellowish white, fine-grained, juicy, brisk, sub-acid; excellent cooking apple. Strong grower, hardy, productive.

Baer. Rather small, roundish-oblate; striped red on greenish yellow; stalk long, cavity wide and deep; basin small, plaited; flesh tender, fine grained, pleasant, very good—keep still spring. Berks County, Pa. Identical with Hiester.

Baldwin.* Rather large, roundish, with more or less of a rounded taper towards the apex; shaded and striped with yellowish red and crimson on yellow ground; stalk three-fourths of an inch long, rather slender, calyx in a narrow, slightly plaited basin; flesh yellowish white, with a rich, sub-acid flavor. Young tree vigorous, upright, shoots dark brown, diverging and ascending. Fig. 380. Very productive. Ripens through winter. A first-rate winter apple in New England, New York, and Michigan; mostly unsuccessful at the West and South. Too tender, and mostly fails as far north as Maine, unless grafted standard height. Massachusetts. The Baldwin is liable to vary in character; the Late Baldwin appears to be identical, but modified by external causes.

Ben Davis. (New York Pippin, Kentucky Streak, Carolina Red Streak, Victoria Red.) Large, roundish-ovate, slightly oblique, regular, smooth, striped red on yellow; stalk long, deep set; basin deep, wrinkled; flesh whitish, tender, with a mild, good, but not rich, sub-acid flavor. Fig. 409. Succeeds well at the West, where it proves one of the most profitable winter apples for market; does not mature well at the extreme North. An early and abundant bearer. The leading commercial variety of America to-day. Kentucky.

FIG. 409.—Ben Davis.

FIG. 410.—Dutch Mignonne.



FIG. 411.—Prior's Red.

FIG. 412.—Dominie.

FIG. 413.—Baldwin.

Bethleheinite. Medium, roundish-oblate, remotely conical; striped red on yellow; stalk short, deeply set; basin deep; furrowed; flesh yellowish white, tender, with a mild, sub-acid, very agreeable flavor. Ripens through winter. Growth strong, upright. Ohio.

Black Gilliflower. Rather large, oblong-ovate, long conical, regular, obscurely ribbed; surface dark, dull, reddish purple, inclining to greenish yellow where densely shaded; cavity very narrow, acuminate; basin very small, ribbed; flesh greenish white, with a rich, good, slightly sub-acid flavor, becoming dry when ripe. Keeps through winter and late into spring. Shoots dark, rather crooked, fruit always fair; very productive. Rejected by most cultivators on account of its very dry flesh, but a good baking variety. Totally distinct from the Red or Cornish Gilliflower.

Blue Pearmain.* Very large, roundish, inclining to oblong, slightly and obtusely conical; dark purplish red in large broken stripes on lighter ground; bloom conspicuous; dots large; indistinct; stalk three-fourths of an inch long; calyx deep set; flesh yellowish, mild sub-acid, good. Early winter. A thin bearer.

Boardman. Medium, roundish; light yellow, splashed, streaked and dotted crimson; stem short; cavity open and rather deep; basin large, deep; flesh very white, crisp, juicy, sub-acid, good. Winter. Maine.

Brightwater. Large, round, conical; greenish yellow, mottled russet, splashed and striped dull red, dots minute yellow and brown; skin thick; flesh greenish yellow, fine-grained, juicy, sub-acid, good. Arkansas.

Bryant. Large, roundish oblate; greenish yellow, shaded with dull red and striped darker, dots numerous, large, gray, many with rough prominent centres, gray over all color; flesh yellow, coarse, tender, juicy, mild sub-acid. Virginia.

Buff. Large, round, oblate, smooth; distinctly striped with light and dark red; cavity broad and deep; basin round, furrowed; flesh white, tender, sub-acid, mild, agreeable, "good," or perhaps "very good," sometimes poor. Much valued at the South.

Bullet. (North Carolina Greening, Green Abram.) Rather small, roundish; striped with light and dark red on greenish yellow; stalk short, often with a lip at base, cavity small; basin deep; flesh tender, juicy, with a pleasant sub-acid flavor. Valuable in Virginia and North Carolina as a long keeper. Tree productive.

Cannon Pearmain. Rather large, roundish or oblong-conical; red on yellow; cavity small, basin abrupt; flesh yellowish, firm, rich, spicy, mild sub-acid. Keep still spring. Tree vigorous, spreading, productive. North Carolina.

Carnahan Favorite. Large, roundish conic; red on yellow; cavity and calyx large, basin furrowed; flesh fine-grained, pleasant, sub-acid. Tree vigorous, productive. Keeps till spring. Ohio.

Carolina Queen. (Carolina Winter Queen.) Rather large, roundish, slightly oblate, smooth and regular; greenish yellow shaded and striped with light dull red; stalk three-fourths of an inch long, cavity wide and rather inclining to obtuse, basin ribbed; flesh yellowish white, sprightly sub-acid, of an excellent flavor. Early winter. Popular in North Carolina.

Carter.* (Mangum.) Medium to large, roundish-ovate; red on orange yellow; stalk rather short, cavity deep, calyx large, open, in a wide, deep, somewhat furrowed basin; flesh tender, mild, pleasant. One of the best apples in the Southern States. Alabama.

Carthouse.* (Gilpin, Romanite, Red Romanite, and Small Romanite, of the West.) Medium or rather small, roundish-oblong, nearly regular, apex flattened; striped and shaded deep red on greenish yellow ground; stalk one-half to an inch long, slender; basin slightly furrowed, wide, distinct; flesh tough, crisp, fresh.

agreeable, mild sub-acid, nearly sweet, of moderate quality. Keeps fresh till late in spring. Much cultivated as a long keeper at the West. **Virginia.**

Chandler. Large, roundish, slightly flattened, somewhat angular; striped and shaded red on greenish yellow; stalk short, cavity large, calyx small, in a wide, plaited basin; flesh greenish white, tender, with a moderately rich, sub-acid flavor. Early winter. Connecticut.

Cogswell. Rather large, roundish-oblate, regular; striped rich red on yellow; stalk small, cavity large, russeted; calyx short, basin small; flesh yellowish, compact, tender, scarcely sub-acid, with a fine, rich, aromatic flavor. Through winter. An excellent dessert fruit. An abundant bearer every other year. Connecticut.

Cooper's Red. (Cooper's Market.) Size medium, oblong conical; shaded and striped with red on yellow; stalk short, cavity deep, narrow; basin small; flesh white, tender, with a brisk sub-acid flavor. Through winter. Shoots long, slender. Profitable, although not of highest quality, New Jersey.

Cranford. Large, oblate; yellow, covered with brownish red, splashed and streaked with light crimson; stem short, thick; basin broad, deep, russeted; calyx wide, deep; flesh yellow, juicy, sub-acid, sprightly. Tree good grower, fair bearer. Winter. Arkansas.

Cross. Medium, regular, oblate; yellow, splashed and striped with crimson, much like Fameuse; cavity deep; basin shallow; flesh white, sub-acid, very good. Fig. 412. Midwinter. Russian.

Cullasaga. Rather large, roundish; slightly conical, striped crimson on yellow; stalk short, slender; cavity deep, russeted; calyx open; basin shallow, furrowed; flesh yellow, tender, very mild, aromatic, rich. A well-known, long-keeping, valuable Southern fruit. North Carolina.

Detroit. (Red Detroit.) Medium or rather large, roundish or slightly conical; skin thick, smooth, dark purple when mature; cavity deep; basin shallow, plaited; flesh white, often stained with red, crisp, of an agreeable sub-acid flavor.

The **Black Detroit**, or **Grand Sachem**, is a larger apple, more irregular; rather dry fruit of inferior quality.

Domine.* (Wells, of Ohio.) Rather large, roundish oblate; surface with narrow and distinct stripes of light red, on whitish yellow ground; dots or specks large, rough; stalk three-fourths of an inch long; cavity wide, deep, acute; basin deep, obtusely ribbed; flesh white, firm, mild sub-acid, spicy, fine flavored. Fig. 412. Shoots very long, vigorous, diverging, leaves drooping, coarsely serrate. Productive. Keeps through winter. Tender at the West. New York.

Dutch Mignonne. Quite large, roundish, regular; rich orange, dotted, mottled, and obscurely striped with bright red, slightly

russeted; stalk nearly an inch long, slender; calyx large, open; basin large, round, even; flesh firm, becoming tender, with a high, rich, rather acid flavor. Fig. 410. Early winter. Native of Holland. A large, handsome, high-flavored, but coarse fruit.

Walbridge. Large, roundish, oblate; red streaked; flesh tender, juicy, sub-acid, vigorous, hardy. Tree prolific bearer, good. Winter.

Elkhorn. Large, oblate, regular; yellowish, striped red and brown, dots light gray, large, and numerous; basin large; eye closed; cavity wide, deep, russeted; stem very short, slender; flesh yellowish, coarse, juicy, sub-acid, pleasant, good. Arkansas.

FIG. 415.
Belle de Boskoop.

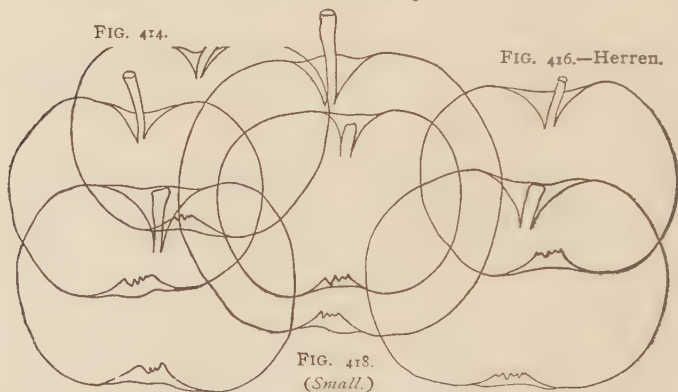


FIG. 417.—Cross.

Grandmother.

FIG. 419.—Sandy Glass.

Eustis. (Ben.) Rather large, roundish, very slightly ovate; striped and dotted with light rich red on rich yellow; stalk very short; basin narrow, rather deep; flesh yellowish, rich, sub-acid, fine. Origin, Essex County, Mass.

Evening Party. Rather large, oblate, slightly oval; yellow, striped with red; stalk short, inserted in a round, deep cavity, often russeted; calyx closed, basin large; flesh juicy, tender, crisp, with a vinous, aromatic flavor. An excellent dessert fruit. Tree health, vigorous, a good bearer. December and January. Pennsylvania.

Flushing Spitzenburgh. Medium, roundish conical; rich red on yellow, with large whitish or fawn spots; cavity, basin, and calyx small; flesh whitish yellow, crisp, with a very mild sub-acid, moderate flavor. Early winter. Shoots strong, brown, unlike the slender, gray shoots of Esopus Spitzenburgh.

Gano.* (Ozark Reagan.) Fruit medium large, oblate, irregular; red striped, handsome; sub-acid, brisk, good; season medium to late. Grown for market in Middle West.

Good Peasant. Medium; greenish yellow, splashed and striped red on the sunny side; cavity russety; basin deep, wrinkled; stem medium; flesh fine-grained, sub-acid, very good; season, mid-winter. Russian.

Grandmother. Medium, regular, roundish oblate; green, striped and splashed with red; calyx broad, large; basin narrow; stem short, stout; flesh firm, juicy. Fig. 418. Mid-winter. Russian.

Granite Beauty. Large, roundish-ovate, longest at middle, ribbed; skin yellow, striped bright red; stalk short, slender; cavity rather small, ribbed; basin medium, furrowed; flesh juicy, rich sub-acid, quality medium. Early and mid-winter. Growth rather spreading. New Hampshire.

Hall.* Rather small, roundish, slightly oblate; striped red on greenish yellow, with russet dots; stalk slender, curved; cavity round, medium; basin small, plaited; flesh yellowish, fine-grained, with a very rich, mild sub-acid, aromatic flavor. Through winter. A widely cultivated and highly esteemed Southern variety. Growth moderate, upright, shoots slender, reddish. Fig. 420. Hardy. North Carolina.

Herefordshire Pearmain. (Royal Pearmain, Winter Pearmain, erroneously.) Medium in size, round-oblong, approaching obtuse-conical; surface mostly covered with indistinct stripes and soft clouds of light red on greenish yellow, which on ripening becomes a pale clear yellow; stalk half an inch long, cavity small; calyx large, open; basin narrow, plaited; flesh yellowish white, fine grained, with a pleasant, mild sub-acid, aromatic, fine flavor. Early winter. Best on light soils. Distinguished from Winter Pearmain by its stronger shoots, less oblong form, and by the soft shades and clouds of fine red, which cover the surface. Fig. 424.

Herren. Medium, regular, oblate; yellow, nearly covered with dark red, splashed crimson; basin wide; stem medium; flesh white, sub-acid. Early winter. Poland. Fig. 416.

Hess. Medium, roundish or conical; striped with red; stalk short, rather stout; cavity narrow, deep; basin deep, narrow; flesh greenish white, tender, with a very good, aromatic flavor. Through winter. Pennsylvania.

Hollow Crown. Size medium, oblong, oval, flattened at crown; skin yellow, striped and splashed with red; stalk short, in a moderate cavity; calyx closed, basin broad; flesh yellowish, with a sprightly excellent flavor. October, January. (Downing.)

Hubbardston.* Large, round-ovate, largest at the middle, nearly regular; color with small broken stripes and numerous dots of light rich red on a rich yellow ground; stalk three-fourths to one inch long; cavity acute, russeted; calyx open, basin ribbed; flesh yellowish, very rich, slightly sub-acid, with a strong mixture of a rich sweet flavor, excellent. Early winter. A famous New England sort—fine at the North and Northwest. Shoots rather slender, gray. A native of Hubbardston, Mass. Loses flavor by keeping. Coming into favor as a commercial sort.

Indiana Favorite. Medium, oblate, regular, handsome; shaded and striped with red on rich yellow, with large yellow russet specks; stem short, cavity wide, calyx open, in a moderate even basin; flesh yellowish, crisp, a mild sub-acid, agreeable flavor, "very good." Tree spreading, excellent bearer. Keeps remarkably well. It is a seedling of the Vandevere Pippin and resembles it, except in being of a deeper red and much less acid, and superior in flavor.

Ingram. (Ingram Seedling.) Medium, roundish conical; yellow, splashed and striped crimson; cavity regular, medium depth, stem short and stout, basin medium; slightly leather cracked; flesh yellowish, fine, tender and juicy when fully ripe, sub-acid, good. Late winter. Seedling of Ralls. Good South. Missouri.

Jersey Black. Size medium, round, somewhat irregular; striped blackish red on lighter red, with numerous small dots; flesh often stained; stalk variable, cavity deep; basin shallow, plaited; flesh yellow, crisp, juicy, mild sub-acid, agreeable. Early winter. Tree vigorous, but does not grow large; spreading, productive. A valuable market apple at the West.

FIG. 420.—Hall.

FIG. 421.—King.

FIG. 422.—Jonathan.

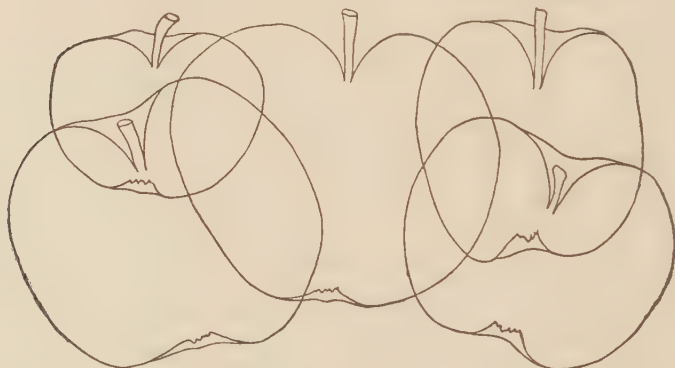


FIG. 423.—Smith's Cider.

FIG. 424.—Herefordshire Pearmain.

Jonathan.* Medium in size, round-ovate, or approaching truncate-conical; regular, nearly covered with brilliant stripes of clear red on a pale yellow ground; stalk slender; basin very distinct, rather deep; flesh white, very juicy, spicy, sub-acid, moderately rich. Keeps through winter. Shoots slender, diverging; tree very productive; fruit always handsome and fair. Fig. 422. Kingston, N. Y. The slender growth of the tree is an objection with cultivators. It succeeds well in most localities and is a popular market variety in many sections, both East and West.

Jones' Seedling. Medium, round conical; light yellow, striped red; flesh sub-acid, almost sweet. Winter. Tennessee.

Kaiser. (Red Seek-no-further.) Size medium, roundish-oblate, often slightly oblique; shaded and obscurely striped with red on greenish yellow; stalk short, cavity large; basin shallow, sometimes deep, furrowed; flesh fine-grained, mild sub-acid, slightly

aromatic, with a very good flavor. Small specimens have a small cavity and are smooth, regular, and are free from ribs. Early winter. Southeastern Ohio. Growth resembles Rambo.

King.* (Tompkins County King.) Large, sometimes quite large, roundish, ribbed; color a deep red, in stripes; flesh tender, juicy, rich, high flavored. Tree a strong grower with few branches. Shoots slightly flexuous: a good but not heavy bearer. Drops its fruit rather early, and should be gathered soon. Early winter, and keeps through winter. Fig. 421. Succeeds East and West at the North, but not so well farther South. New Jersey.

Lacker. Rather large, oblate, somewhat irregular; striped light and dark red on greenish yellow, with conspicuous whitish specks; stalk half an inch long; basin furrowed; flesh white, fine-grained, firm, crisp, fresh, mild, agreeable, sub-acid. Keeps through winter. Cultivated in Western New York; originally from Lancaster, Pa.

Large Anis (Cross.) Large, irregular conic; yellowish green, splashed and striped with red; cavity deep, stem medium, basin regular, deep; flesh fine-grained, mild acid, good. Will prove valuable north of parallel 43°, where it will keep through the winter. Fig. 433. From the Upper Volga, Russia.

Lawver. Large, roundish, regular; with surface handsomely striped with red, sub-acid, good. It is not very productive and does not promise well for a market variety. Winter. West. Fig. 468. Missouri.

Limbertain.* (James River.) Large, roundish, slightly conical; striped and splashed with red on yellow; stalk long, slender, calyx rather small; flesh yellowish, very compact, not high flavored, but cultivated in the South and West for its keeping properties. The tree is ill shapen, with pendent branches, whence its name. Distinct from the Willow Twig. North Carolina.

Long Stem of Pennsylvania. Rather small, roundish-oval; shaded and slightly striped with red or crimson on yellow; stalk long, slender, curved, cavity large; basin somewhat furrowed; flesh tender, crisp, with a rich, aromatic, sub-acid, excellent flavor. Berks Co., Pa. A fine dessert fruit.

McLellan. (Martin.) Medium in size or rather large, nearly round, smooth, regular; striped and mottled with lively clear red on yellow ground; stalk three-fourths of an inch long, slender; cavity narrow; basin narrow, waved; seeds small; flesh nearly white, fine grained, very tender, slightly sub-acid, agreeable, but not very rich. Early winter. Very productive. Connecticut. Fig. 429.

Mallett. Large, roundish oblate; greenish yellow, marbled red with crimson slashes; cavity shallow, stem medium; basin wide, wrinkled; flesh white, coarse-grained, juicy, sub-acid, quality good. October. In Minnesota it keeps well into the winter. Fig. 435. Russian.

Marston's Red Winter. Large, roundish-oval, regular, slightly narrowed to each end, smooth; striped with bright red and crimson on yellow ground; stalk half an inch long, slender; cavity

russeted; basin abrupt, round, smooth; flesh yellowish, fine-grained, tender, juicy, high flavored. Ripens through winter. Origin, New Hampshire.

Mickel. No. 1. Large, oblate, smooth; glossy, greenish white, striped light red, dots few, white; cavity large, very deep, slightly russet; stem short, slender; basin medium, deep, abrupt, folded; eye small, closed; flesh white, fine-grained, tender, juicy, slightly sub-acid, good. Wisconsin.

Milam. Rather small, roundish; greenish, shaded and striped with red; flesh rather firm, with a pleasant, sub-acid, moderate flavor. A good keeper. Although not of high flavor, it is widely cultivated at the West and Southwest on account of its hardiness, productiveness, and good keeping qualities. Does not succeed well farther North. Fig. 425.

FIG. 425.—Milam. FIG. 426.—Mother. FIG. 427.—Roxbury Russet.

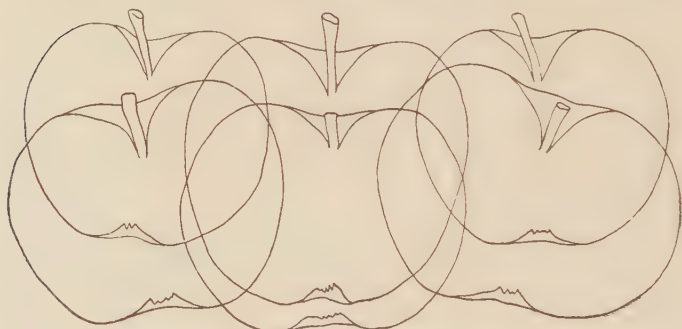


FIG. 428.—Rawle's Janet. FIG. 429.—McLellan. FIG. 430.—Nickajack.

Minister. Large, rather irregular, oblong-conical, ribbed, surface more or less wavy, base broad, apex very narrow; very distinctly striped with red on greenish yellow ground; stalk one inch long, slender; cavity usually wide, shallow, and irregular; flesh yellowish, moderately rich, sub-acid, flavor second quality. Productive, fair, and showy. Early winter. Apt to be warty. Mass.

Mother.* Rather large, oblong-ovate, approaching conical; slightly and obtusely ribbed; color a high warm rich red on yellow ground; deep red to the sun—in obscure broken stripes and spots; stalk three-fourths of an inch long, cavity moderate; basin small, plaited; flesh yellow, more so toward the outside, moderately juicy, rich, very spicy, very mild sub-acid, with an admixture of sweet. Somewhat resembles the Esopus Spitzenburgh in external appearance, and in its rich yellow flesh and spiciness. Growth slow. Fig. 426. Late autumn and early winter. Worcester County, Mass.

Monk's Favorite. Large, roundish, slightly oblate, ribbed; mottled and striped red on yellow; stalk short, cavity wide, calyx

small in a broad basin; flesh yellowish white, with a very good snb-acid flavor. A long keeper.

Newark King. Size medium, conical; skin smooth, red in streaks on yellow ground; flesh tender, rather rich, pleasant. Early winter. Origin, New Jersey.

New York Vandevere.* (Newtown Spitzenburgh, Ox Eye.) Medium in size, round-oblate, regular; color light red in indistinct streaks on yellow ground, often a high red where exposed; dots numerous; stalk uniformly about half an inch long, cavity and basin wide; flesh light yellow, with a rich, mild, sub-acid, excellent flavor. Early winter. Not always fair—succeeds best on light soils. Shoots spotted; leaves doubly serrate-crenate. New York.

Nickajack.* (Summerour, Berry, Edwards, Carolina Spice, Red Hazel.) Rather large, smooth, handsome, roundish, slightly oblong; splashed, striped, and mottled with deep red, and with large whitish spots; stalk short, deep set, basin moderate, rim obtuse, calyx open; flesh yellow, rather firm, sub-acid, spicy, very good. Fig. 430. Keeps till spring. Growth irregular—a good bearer. A standard Southern variety, and a good market sort in lower Ohio valley. Georgia.

FIG. 431.—Recumbent. FIG. 432.—Anis. FIG. 433.—Large Anis.

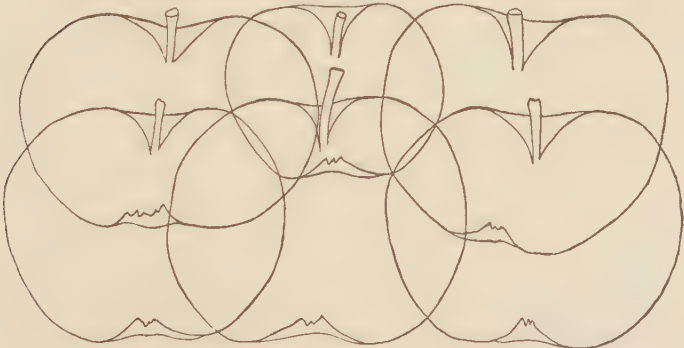


FIG. 434.—Titus (Riga). FIG. 435.—Mallett. FIG. 436.—Rambour Queen.

Northern Spy.* Large, roundish-conical, often flattened, slightly ribbed; handsomely striped with red; stalk and calyx deep set; flavor rich, aromatic, mild sub-acid, fine. Keeps through winter and late into spring; preserves its flavor remarkably fresh. Shoots dark, spotted, erect, stout. A tardy bearer. To afford fine fruit, the tree must be kept thrifty by good cultivation. A native of East Bloomfield, N. Y. A fruit of the highest quality, and profitable for market under proper cultivation, and with care in picking, assorting, and packing. Succeeds throughout the North and Northwest, but less valuable farther South. Fig. 439.

Osceola. Size medium, roundish-oblate, angular; skin yellowish, shaded and striped with red; stalk small; cavity large, russeted;

basin deep; flesh yellowish, firm, crisp, mild sub-acid, "very good." A good keeper. Indiana. Resembles New York Vandevere.

Perry. Medium, oblate, regular, smooth; yellow shaded and striped bright red, dots numerous, large, russety; cavity large, deep, russet; stem short, medium; basin medium, folded; calyx short; flesh yellow, fine-grained, tender, juicy, mild sub-acid, good. A good bearer and long keeper. Ohio.

Pewaukee.* Fruit medium to large, roundish oblate; striped with dark red on a bright yellow ground; flesh white, tender, brisk sub-acid. Seedling of Oldenburg. Valued for its hardness. Wisconsin.

Pilot. Medium, round, regular, smooth; yellow covered by dull red, with brighter splashes of lighter red, dots numerous, large, gray, sometimes star-shaped; basin deep, regular; eye small, closed; cavity shallow, narrow, slightly russeted, stem short; flesh yellow, fine-grained, firm, juicy, mild sub-acid, rich, very good. Fig. 440. Virginia.

FIG. 437.—Willow Twig.

FIG. 438.—Winesap.



FIG. 439.—Northern Spy.

FIG. 440.—Pilot.

FIG. 441.—Rome Beauty.

Pryor's Red.* (Pryor's Pearmain.) Medium or rather large, roundish, irregular, varying, apex often broad, sometimes narrow, considerably or slightly ribbed; color dull brick red on greenish yellow in dots, shades, and obscure streaks, slightly russeted; stalk long or short, cavity small; calyx open, basin narrow; flesh very tender, mild, rich, sub-acid, agreeable. Highly esteemed in Indiana, Kentucky, and Virginia—where it keeps till spring—and succeeds well farther North. Often a poor bearer. Fig. 441. Va.

Ragan. Large, roundish ovate; striped and marbled with red on light greenish yellow ground; stalk medium to long, cavity deep, basin deep; flesh yellowish white, of a rich, spicy, rather acid flavor. Early winter. Putnam County, Ind.

Rambour Queen. Large, irregular oblate; greenish yellow, splashed with crimson; cavity medium, stem medium, basin wide, irregular; flesh white with greenish veinings, very juicy, sub-acid, good. Late autumn. Fig. 436. Good for keeping in cold storage. Russian.

Rail's Genet.* (Rawle's Jenneting, Neverfail, Rockremain.) Medium in size, roundish, approaching oblong or obtuse-conical, often oblique; color pale red, distinct stripes on light yellow ground; stalk half an inch long; flesh nearly white, fine, mild, sub-acid, fine texture, crisp, juicy. Growth slow; a profuse bearer, with a portion of the crop knotty or under size. Keeps through spring. Highly esteemed in the Ohio valley; does not succeed farther North. The blossoms open ten days later than usual, thus sometimes escaping spring frosts; hence the name Neverfail. Hardy far West. Fig. 428. France.

Recumbent. (Lieby.) Large, irregular, oblate; yellow splashed red and crimson; cavity deep, regular, basin wide; skin astringent, good for cooking. Fig. 431. Russian.

Red Canada.* (Nonsuch, Old Nonsuch of Massachusetts, Richfield Nonsuch of Ohio.) Medium in size, roundish-conical, regular; nearly the whole surface covered with red, and interspersed with large and rather indistinct whitish dots; stalk about an inch long, in a very wide and even cavity; basin nearly even, moderate; flesh fine-grained, compact, with a rich, sub-acid, high and excellent flavor. Keeps through winter. Shoots rather slender, leaves wavy. Productive. Succeeds in New England, New York, and Ohio. This is wholly distinct from the Nonsuch of England, to prevent confusion with which the name Red Canada is preferred. One of the finest table apples, often keeping late in spring. The slender growth of the tree, the frequent scabiness of the fruit, and its moderate crops in some localities, are the chief drawbacks on its value. Fig. 450.

Red Winter Pearmain. (Red Lady Finger, Meigs, Red Fall Pippin, and Red Vandevere of Tennessee.) Size medium, oblong conical; dark purplish red on yellow, with numerous whitish dots; stalk short, cavity narrow; basin small; flesh whitish, very tender and juicy, with a mild, slightly sub-acid, slightly aromatic flavor. Mid-winter. Growth moderate, upright; a regular bearer.

Robey's Seedling. Large, roundish conic; obscurely striped with lively red; flesh yellowish, juicy, with a rich, high flavor. Early winter. Succeeds in Middle and Western States. Tree vigorous and productive.

Rome Beauty.* Large, roundish, very slightly conical; mostly covered with bright red on pale yellow ground; flesh tender, not fine-grained, juicy, of good quality. Ripens early in winter. The large size and beautiful appearance of this Ohio apple render it popular as an orchard variety. Fig. 441.

Royal Table. Medium, conical, ribbed, greenish yellow, red stripes on yellow side; cavity wide, shallow; basin wide; flesh greenish white, quality good. Early winter. Russian.

Russet Pearmain. Size medium, roundish-conical; faint red stripes on greenish yellow ground; flesh juicy, tender, rich, fine sub-acid flavor. Through winter.

Shockley. (Waddel's Hall.) Medium, roundish-oblong, narrowing to the eye; yellow striped and clouded with red, with dark greenish russet blotches; stalk long, slender; cavity narrow, deep; flesh firm, of good but not high flavor. Georgia. Ripens from October to March. Wm. N. White.

Siloam. Medium, oblate, regular, smooth; yellow, with dull red stripes and splashes, dots numerous, small, light gray; basin shallow, regular; eye small, closed; cavity shallow, russeted; stem very short; flesh yellow, juicy, sub-acid, rich, very good. Arkansas.

Sknrishapfel. Medium; flat, conical, ribbed; yellow, flushed and striped with red; cavity and basin shallow and ribbed; flesh firm, sub-acid. Mid-winter. Belongs to Cross apple family, and may prove identical with the Russian Baldwin. Russian.

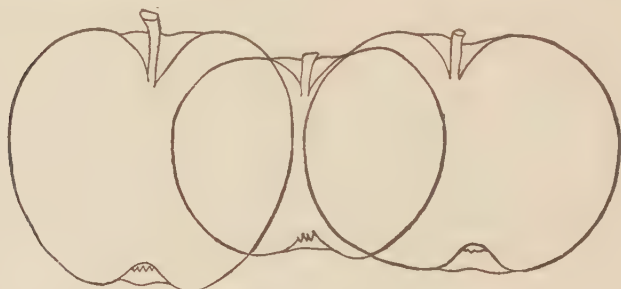


FIG. 442.
Esopus Spitzenburgh.

FIG. 443.—Westfield,
Seek-no-Further.

FIG. 444.
Wagener.

Smith Cider.* Medium or rather large, roundish-oblong, somewhat flattened at the ends; shaded and slightly striped with light red on pale greenish yellow, with a few conspicuous whitish, yellow dots; stalk slender, cavity rather deep, calyx large; basin shallow, wrinkled; flesh whitish, tender, crisp, with a sub-acid, moderate flavor. Grown in Pennsylvania and the Ohio valley. Valued for its hardiness, productiveness, and handsome fruit. Pennsylvania. Fig. 423.

Spitzenburgh, Esopus.* Rather large, round-ovate, slightly conical; surface a high rich red, rather obscurely striped; stalk three-fourths of an inch long, rather slender; basin shallow, slightly furrowed; flesh yellow, firm, crisp, spicy, rather acid, nearly unequalled in its high rich flavor. Keeps through winter. Shoots ascending and erect, rather slender leaves crenate. Usually a moderate bearer. Fig. 442. Succeeds best in New York, its native State.

Sutton Beauty.* Fruit large, roundish; skin waxen yellow, striped and shaded with crimson, very handsome; flesh white, tender,

sprightly, very good. A late keeper. Tree a free grower and productive. Coming to be one of the most profitable market varieties in the East. Massachusetts.

Wagener.* Medium, oblate, distinctly ribbed; shaded and indistinctly striped with pale red, and a full, deep red in the sun on warm yellow ground; often streaked with russet; stalk three-fourths of an inch long; cavity wide, rather obtuse; basin even, rather large; flesh yellowish, fine-grained, tender, compact, mild sub-acid, aromatic, excellent. Ripens through winter. From Penn Yan, N. Y. Fig. 444. Succeeds well at the West. An early bearer.

Wellford's Yellow. Rather small, roundish oblate; faintly streaked with red on pale yellow; flesh yellow, fine-grained, juicy, with a rich, aromatic flavor. Rapid grower, great bearer, and long keeper. Cultivated in Maryland and Virginia.

Westfield Seek-no-Further.* (Connecticut Seek-no-further, New England Seek-no-further.) Medium or large, roundish, often slightly conical; obscurely striped with light dull red, more or less russeted, rarely covered wholly with russet; stalk slender; calyx partly open; flesh tender, rich, spicy, of fine flavor. Early and mid-winter. Tree productive, fruit always fair. Connecticut. Fig. 443. Succeeds well throughout the Northern States.

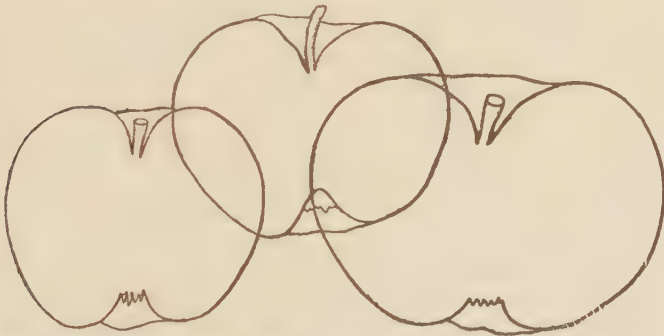


FIG. 445.—Scott's Winter. FIG. 446.—Windsor. FIG. 447.—Wolf River.

Willow Twig.* Large, roundish, slightly conical, obtuse, very regular; greenish yellow, striped and mottled faintly with dull red; stalk short; basin very wide and deep, rim obtuse; flavor sub-acid, or rather acid, not rich. A long keeper. Shoots slender. Cultivated as a market apple in Southern Ohio. Fig. 447.

Windsor. (Windsor Chief.) Small, oblate; greenish yellow suffused with red splashes, gray dots; flesh pale yellow, fine-grained juicy, sub-acid, good. Tree early bearer and prolific. Winter. Wisconsin. Fig. 446.

Wine. (Hays' Apple, Hays Winter.) Rather large, often quite large, roundish, slightly flattened; obscurely striped and mottled

with red on yellow ground; stalk quite short; cavity deep, acuminate; calyx large, open; basin large; flesh yellowish white, with a rich sub-acid flavor. Early winter. There are several spurious varieties under this name. Delaware.

Winesap.* Size medium, round-ovate, slightly conical, sometimes obscurely flattened; color a lively deep red; stalk slender, three fourths of an inch long; cavity acute; calyx small, in a finely plaited basin; flesh yellowish, firm, crisp, with a rich sub-acid or rather acid flavor. Keeps through winter. One of the best apples for baking. Growth rather irregular, fruit formerly always fair, of late years more imperfect. Widely cultivated at the West and Southwest. Fig. 438.

Winter Aport. Large, flat, conical; greenish yellow, red striped; cavity deep; basin shallow, ribbed; stem medium; flesh yellowish, firm, sub-acid; good. Season, winter. Russian.

Wolf River. Very large, round oblate, regular, smooth; yellowish white, splashed with bright red, dots large, scattering, light gray; basin shallow, small; eye medium, open, segments reflexed; cavity deep, wide, very russet; stem short, stout; flesh yellowish white, coarse, tender, dry when ripe, sub-acid, not rich, medium quality only. Valuable in the Northwest. Winter. Fig. 447. Wisconsin.

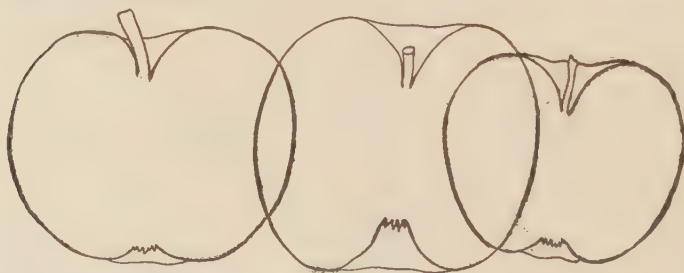


FIG. 448.
Yellow Transparent.

FIG. 449.
York Imperial.

FIG. 450.
Red Canada.

Yacob. Large, oblate, smooth; yellow, striped and splashed crimson, dots few, gray; cavity regular, deep, abrupt, green; stem short, slender, basin deep, calyx twisted, eye small, closed; flesh yellowish white, slightly tinged with red, fine-grained, tender, juicy, sub-acid, spicy, good. Pennsylvania.

Yates. Small, oblate; yellow, covered with dark red stripes, small white dots; flesh yellow, spicy, sub-acid. Great bearer and good keeper. Georgia.

York Imperial.* (Johnson's Fine Winter.) Medium, oblong, angular, oblique, often varies in form, smooth; yellow, shaded red, indistinct red stripes; basin deep, wide; eye nearly closed; cavity deep, narrow, russeted; stem short; flesh yellow, firm, juicy, sub-acid, good. Winter. Pennsylvania. An excellent shipping apple, always brings high prices. Fig. 449.

Section 11.—Not Striped.

Antonovka. Roundish oblate; yellow with white bloom; basin deep and cavity acute; flesh yellow, sub-acid, crisp, good. Tree not so hardy as some varieties received from Northern Europe which much resemble it in form and fruit. Fig. 452. Russian.

Arabsko. Large, conic; green covered with purplish red; cavity medium, stem medium, basin shallow; flesh greenish white, sharp, sub-acid. Winter. Fig. 459. Russian. Often rots on the trees.

Aunt Hannah. Size medium, roundish, approaching ovate; straw color, with a very pleasant mild sub-acid, fine flavor, resembling in character the Newtown Pippin. Origin, Essex County, Mass.

Basil the Great. (Vasilis Largest.) Large, roundish, oblong, unequally truncated, irregular; yellow, mostly covered with dark red and crimson; cavity deep, acute; stem very short; basin wide, deep, abrupt; flesh coarse grained, red next skin, juicy, sub-acid, excellent for culinary use. Very showy apple and is a profitable market one. The trees are said to endure drought without lessening the size of the fruit. Russian. Fig. 379.

FIG. 452.—Antonovka.

FIG. 453.—Iowa Blush.

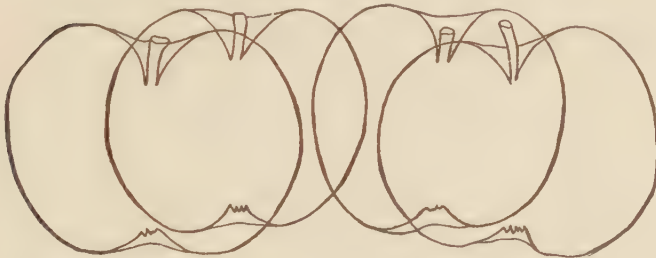


FIG. 451.—Bergamot.

FIG. 454.—Anisovka.

Belle et Bonne. Large, roundish, flattened at ends, obtuse; greenish yellow; stem short; calyx in a wide, deep basin; flesh yellow, tender, large grained, sub-acid, agreeable, and very good. Early winter. A Connecticut apple; a strong growing and productive variety, much esteemed in the neighborhood of Hartford.

Belmont.* Rather large, roundish-conical or ovate-conical, apex usually narrow, but sometimes quite obtuse; faintly ribbed, smooth; color clear pale yellow, with sometimes a light vermillion blush, and rarely with large thinly scattered carmine dots; stalk varying from half an inch long and stout, to an inch or more long and slender; basin in conical specimens, narrow and shallow; in obtuse specimens, narrow and deep, with an obtusely ribbed rim; flesh yellowish white, compact, crisp, becoming quite tender, with a mild, rich, sub-acid, fine flavor. Leaves crenate. Early winter. A profuse bearer. Excellent in New York, Michigan, and Northern and Central Ohio—worthless at Cincinnati. Tender at the West. Fig. 466.

Bergamot. Medium, regular, oblong, cylindrical; yellow with white bloom, has much the appearance of Grimes' Golden; cavity regular, deep; stem very short; basin deep, ribbed; flesh yellow, crisp, sub-acid, good. Fig. 451. Russian.

Boiken. Medium, roundish conic; yellowish green, reddened on sunny side, cavity large; stem short; basin large; flesh white, acid. Very late keeper, good culinary apple. Fig. 456. Russian.

Brooke's Pippin. Large, roundish, slightly conical; greenish yellow, with a faint blush; stalk short and stout; cavity deep, russeted; basin small, shallow, furrowed; flesh crisp, aromatic. November to March. Productive. Maryland and Virginia.

Bullock's Pippin, or American Golden Russet.* (Golden Russet, Sheepnose.) Rather small, conical; light yellow, sprinkled and sometimes overspread with thin russet; stalk long, slender; basin very small and narrow, ribbed; flesh yellowish white, very fine grained, becoming very tender, with a mild, rich, slightly sub-acid flavor. Growth erect, shoots rather slender; leaves sharply serrate; tree overbears. Early winter. When well ripened, this apple is

FIG. 455.—Longstem. FIG. 456.—Boiken. FIG. 457.—Rosenhager.

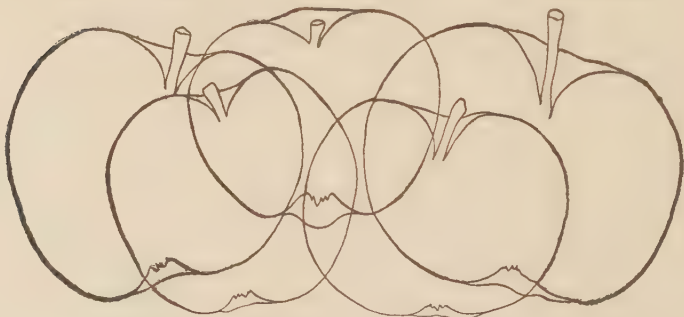


FIG. 458.—Red Queen. FIG. 459.—Arabsko.

exceedingly delicate and tender; sometimes it does not become soft in ripening, when the quality is poor, and often worthless. It is too small to become very popular. Generally rendered worthless at the East by black mildew, and becoming more affected with it at the West. Fig. 399. New Jersey.

Canada Reinette. (Reinette du Canada, Canadian Reinette.) Quite large, somewhat conical and flattened; rather irregular, ribbed, apex obtuse; greenish yellow, sometimes a brown cheek; stalk short, cavity wide; calyx large; basin rather deep, irregular; flesh nearly white, rather firm, becoming quite tender, juicy, with a good, lively sub-acid flavor. Early and mid-winter.

Clarke Pearmain. Size medium, roundish, slightly conical; skin inclining to rough yellow and russet in shade, light rich red in the sun, thickly dotted with whitish russet; cavity and basin medium; flesh yellowish white, with a very good sub-acid flavor. Tree productive. A well-known Southern variety. North Carolina.

Cumberland Spice. Rather large, varying from roundish conical to long conical, the tapering sides being nearly straight and not rounded; color waxen yellow, with a slight vermilion tinge near the base, and with black specks on the surface; stalk half to three-fourths of an inch long; cavity wide, slightly russeted; calyx open, basin even; flesh yellowish white, breaking, rather light; core hollow; flavor mild sub acid, with a peculiar and agreeable spiciness, of good quality.

Dansic Pepka. Large, roundish oblong; greenish yellow with blush; cavity very narrow, deep; stem short; basin small, wide, shallow; flesh white, juicy, sub-acid, fair. Late winter. Russian. Fig. 460.

English Russet.* (Poughkeepsie Russet.) Medium or rather small, roundish conical, regular; surface more or less overspread with brownish russet on light greenish yellow ground; in large exposed specimens, wholly russeted; stalk one-half to three-fourths of an inch long; cavity moderate, round; basin smooth; flesh green-

FIG. 460.—Dansic Pepka. FIG. 461.—Lead.

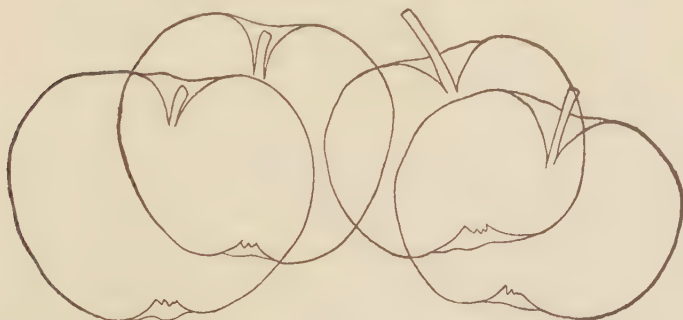


FIG. 462.—Zugoff Winter.

FIG. 463.—Romna.

ish or yellowish white, texture fine, rather firm, with an aromatic, sub-acid flavor. Keeps through spring, and often through summer for twelve months. Growth upright, shoots lively brown. A profuse bearer. A profitable market variety, but of rather poor quality. New York.

Fallwater.* (Tulpahocken, Fornwalder.) Rather large, roundish, and slightly ovate-conical, very regular, smooth; color a smooth shade of dull red on light greenish yellow, with a few large whitish dots; stalk slender; cavity narrow, acuminate; basin small; flesh greenish white, fine-grained, with a mild, slightly sub-

acid, moderate flavor. Early winter. A native of Pennsylvania. Although this fruit is of quite moderate quality, its large size and fair appearance render it very popular in Pennsylvania, Ohio, and portions of the West. Fig. 464.

Fulton. Rather large, roundish, flattened at ends, slightly oblique; skin smooth, yellow, often with a handsome blush; stalk rather short, cavity deep; basin large, slightly wrinkled; flesh yellowish, white, fine-grained, with a mild sub-acid flavor. Illinois—valued at the West.

Golden Ball. Large, often quite large, roundish, remotely conical, ribbed; fine yellow; stalk short, slender, with fine green rays or furrows radiating from the centre of the cavity; basin very shallow; flesh tender, rich, aromatic. Ripens late in autumn, and keeps through winter. Liable to vary in size and fairness. Excellent for cooking. Tree very hardy; a poor bearer. Cultivated chiefly in Maine.

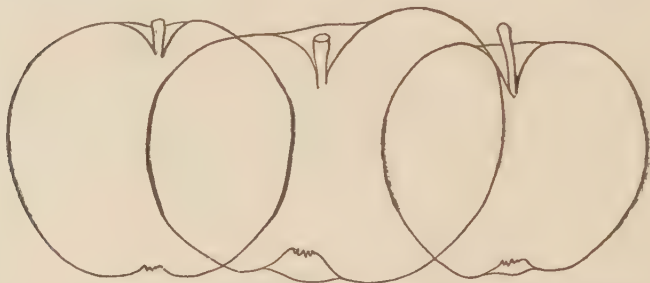


FIG. 464.—Fallawater. FIG. 465.—Huntsman. FIG. 466.—Belmont.

Golden Pippin, of Westchester County. (American Golden Pippin, New York Greening.) Form variable, oblate, globular or conic, ribbed; skin golden yellow; stalk short, deeply set; basin irregular; flesh yellow, tender, juicy, with a rich, refreshing, aromatic flavor. Early winter. Tree spreading—very productive.

Golden Russet.* (Golden Russet of Western New York.) Size medium, roundish, usually a little oblong, sometimes slightly flattened, nearly regular; surface sometimes wholly a thick russet, and at others a thin broken russet on a greenish yellow skin; stem slender, from half an inch to an inch long, being longest on oblate specimens; flesh fine-grained, firm, crisp, with a rich, aromatic flavor. Shoots speckled; tree rather irregular. Keeps through winter. This is distinct from the English Russet, of straight upright growth, and a very long keeper, and from the American Golden Russet or Bullock's Pippin. English.

Green Seek-no-further. Large, often quite large, roundish, slightly approaching oblong obtuse conical; greenish yellow becoming yellow, specks large and conspicuous; stalk very short; calyx large, basin slightly ribbed, deep; flesh rather coarse, sub-acid, of good flavor.

- Grimes' Golden.*** Above medium, roundish, slightly oblong, regular; skin yellow, with large russet dots; stalk slender, in a deep cavity; basin deep, slightly wrinkled; flesh of yellowish white, with a mild sub-acid, agreeable, very good flavor. November. Virginia. Unexcelled for home use.
- Hughes.** Large, roundish; skin greenish yellow, with a blush; stalk slender; calyx large, open; basin wide, deep; flesh fine grained, tender, with an excellent, agreeable, aromatic flavor. Berks Co., Pa.
- Huntsman.** (Huntsman's Favorite.) Large, unequal, oblate, smooth; yellow, large distinct dots; stem medium to short, basin wide, deep, eye open; cavity wide; flesh yellow, fine-grained, firm, juicy, sub-acid, rich, very good. Winter. Western. Fig. 465. Missouri.
- Iowa Blush.** Medium, conical, regular, smooth; yellow, blushed red on sunny side; cavity regular, deep; stem medium; flesh fine grained, juicy, sub-acid, good. A seedling originating in Iowa. Midwinter. Fig. 453. Russian.
- Kinnard.** (Kinnard's Choice.) Medium, oblate; yellow, covered with dark red; flesh tender and juicy. Tree vigorous, hardy. Bears young. Tennessee.
- Lady Apple.*** (Pomme d'Api.) Quite small, regular, flat; a brilliant deep-red cheek on light clear yellow; stalk and calyx deep set; flesh tender, delicate, sub-acid, flavor good. A fancy dessert apple, sometimes selling for \$10 a barrel. Winter and spring. Tree rather tender. France.
- Lead.** Medium, irregular, oblate; greenish yellow, red blush; cavity acute, stem long; basin very wide, shallow; quality good. Mid-winter. Fig. 461. Russian.
- Ledenets.** Large, roundish oblate; yellow, with white veinings; cavity regular, basin wide, stem medium; flesh white, sub-acid, juicy. Mid-winter. Russian.
- London Pippin.** Large or very large, roundish, slightly flattened, obtuse-conical; greenish yellow; stalk very short; calyx large, in a smooth even basin; flesh sub-acid, of a good second-rate flavor. Early winter. Much cultivated in Northern Virginia; and from its large size and handsome appearance sells well in the Washington market. Productive.
- Longfield.*** Medium, round-conic, regular; yellow; cavity narrow; stem large, slender; basin small; flesh white, melting, juicy, sub-acid, quality good. A fine fall or early winter apple. Fig. 374. Russian.
- Lubsk Queen.** Medium, irregular oblique; white, more or less covered with rosy red; very smooth, polished and waxy; cavity small, acute; stem medium; basin wide, rather shallow; flesh snow white, firm, juicy, sub-acid, very good. Late autumn. Keeps well in cold storage until March. Fig. 380. Russian.
- Mann.** Fruit large, roundish oblate; yellow, with a brownish-red cheek; mild, juicy, good. Tree an upright grower and annual bearer. Keeps till April. New York.
- Marshall Red.** Large, oblong ovate; bright red all over; acid, good bearer; a cross between Yellow Bellflower and Red June. Does well in the West.

Michael Henry Pippin.* Size medium, roundish-ovate, apex narrow; yellowish green; stalk short, rather thick; basin narrow. flesh yellow, tender, juicy. Growth upright. Through winter. Origin, Monmouth County, N. J. Fig. 467.

Monmouth Pippin.* (Red-cheeked Pippin.) Rather large, roundish-oblate, light greenish yellow, with a fine red cheek; flesh crisp, juicy, mild sub-acid, with a good rich flavor. Keeps through winter. Fig. 402. New Jersey.

Monstrous Pippin. (Gloria Mundi, Ox Apple, Baltimore.) Very large, roundish, somewhat flattened at the ends, slightly angular or ribbed; skin smooth whitish green, becoming whitish yellow; stalk stout, short; calyx large; basin wide, deep, somewhat ribbed, with an obtuse rim; flesh white, tender, rather coarse, sub-acid, not rich. Late autumn and early winter. A good cooking apple.

FIG. 467.—Michael Henry Pippin. FIG. 468.—Lawver.

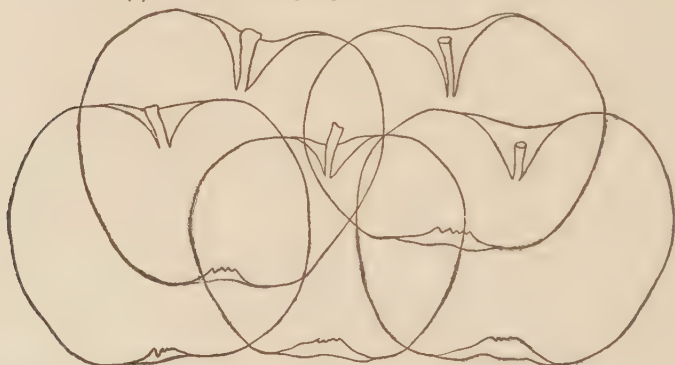


FIG. 469.—Wealthy. FIG. 470. FIG. 471.—White Pippin.
White Winter Pearmain.

Newtown Pippin.* (Pippin, Green Newtown Pippin.) Medium or rather large, roundish, oblique, slightly irregular, remotely conical or else a little flattened; dull green becoming yellowish green, often with a dull brownish blush; stalk short, deep set, and surrounded by thin, dull, whitish russet rays; basin narrow, shallow; flesh greenish white, juicy, crisp, fine-grained, with a high, fine flavor. Keeps through spring, and retains remarkably its freshness. Tree of rather slow growth, with a rough bark. The fruit is very liable to black spots or scabs, unless under high, rich, and constant cultivation. One of the best fruits for foreign markets. A native of Newtown, Long Island. Extensively grown in Virginia and California.

Newark Pippin. (French Pippin, of some.) Rather large, round-oblong, regular; greenish yellow, becoming yellow; stalk and calyx deep set; flesh tender, rich, and high flavored. Growth crooked, irregular. Early winter.

Northwestern Greening. Tree a free grower, spreading; fruit large, oblate, inclined to conic; skin pale yellow when fully ripe; flesh coarse, juicy, mild, good. Season December to April. Wisconsin.

Ortley.* (White Detroit, Ortley Pippin, Warren Pippin, White Bellflower, Woolman's Long, Detroit, Jersey Greening, Detroit of the West.) Large, roundish, somewhat oblong-ovate; pale yellow, slightly tinged with pink in the sun; stalk about an inch long; sometimes short, but always slender; cavity deep and narrow; basin rather deep, nearly even or slightly plaited; flesh sub-acid, crisp, sprightly, rich, fine. Shoots slender. This fine fruit has had a high reputation in the Ohio Valley, but it is becoming much affected with the black mildew or scab. Fig. 476. New Jersey.

Peck Pleasant.* Large, often quite large, roundish, sometimes remotely oblong, often a little oblique, usually slightly flattened; smooth and regular; color light green, becoming yellow, with a brown blush; stalk very short, one-fourth to one-half an inch long, thick, rarely longer and somewhat slender; calyx open, basin abrupt, rather deep; flesh compact, very tender, with a mild, rich, fine, clear sub-acid, Newtown Pippin flavor. Early winter; poor, if too ripe. Growth rather erect. Shoots somewhat diverging. A good bearer; fruit always fair. Fig. 473. R. I. Tender far West.

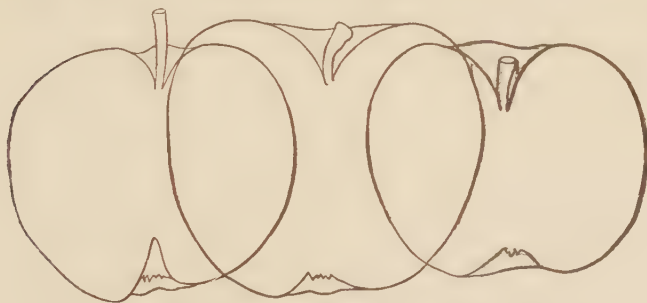


FIG. 472.
Switzer.

FIG. 473.
Peck's Pleasant.

FIG. 474.
Green Mt. Pippin.

Pittsburg Pippin. (Father Apple, William Tell.) Large, roundish-oblate; pale yellow; stalk small, cavity large; basin broad-furrowed; flesh tender, with a mild sub-acid flavor. Early winter. Valued in Pennsylvania. An irregular, spreading grower.

Pomme Gris.* (Gray Apple.) Rather small, roundish-oblate; a gray russet; stalk slender, cavity wide, rather obtuse; calyx small, basin round; flesh very tender for a russet, and fine-grained, rich, and high flavored. Canada. One of the best dessert apples for the extreme north.

Pound Royal. (Pomme Royale, *erroneously*.) Large, sometimes furrowed, roundish, slightly oblong, a little uneven; surface whit-

ish yellow; stalk slender, an inch and a quarter long, cavity large; basin furrowed, regular; flesh tender, breaking, fine-grained, mild, agreeable, sprightly. Ripens through winter. Tree vigorous, productive. Origin, Pomfret, Conn.

Progress. Rather large, roundish-conical, often slightly oblate; smooth, yellow, often with a brownish cheek; stalk short, cavity russeted; calyx large, basin shallow; flesh crisp, with a pleasant sub-acid flavor. Connecticut.

Red Russet. Large, roundish-conical; yellow, shaded with dull red and deep carmine in the sun; thickly dotted with some rough russet; stalk short and thick; calyx with long segments, basin narrow, uneven; flesh yellow, solid, crisp, tender, with an excellent, rich, sub-acid flavor, somewhat resembling Baldwin. (C. Downing.) Said to be a graft hybrid between Baldwin and Roxbury Russet.

Red Queen. Medium, irregular conical; greenish yellow, red blush on sunny side; cavity small; stem short, stout; basin small; flesh white, green veinings, quite acid. Late winter. Fig. 458. Russian.

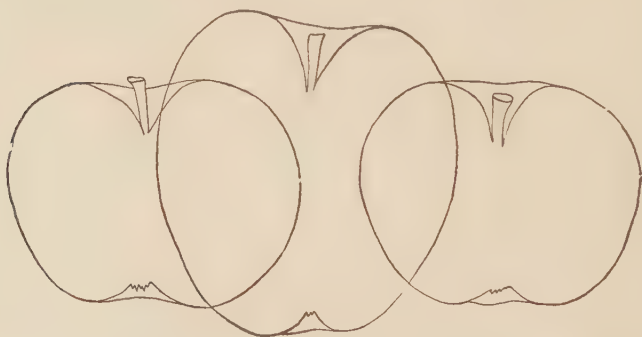


FIG. 475.—R. I. Greening. FIG. 476.—Ortley. FIG. 477.—Arkansas Black.

Rhode Island Greening.* (Greening.) Large, roundish oblate; green, becoming greenish yellow, always fair, a dull brown blush to the sun; stalk three-fourths of an inch long; basin rather small, often slightly russeted; flesh yellow—a rich yellow if much exposed to the sun, and whitish yellow or greenish white if much shaded—tender, juicy, with a rich rather acid flavor. Growth strong, young trees crooked or oblique, shoots rather spreading, leaves sharp serrate; very productive, single trees sometimes yielding forty bushels of fair fruit in favorable years and orchards 500 bushels per acre. Fine in New England and New York. Fig. 475. Tender far West. Susceptible to scab. Rhode Island.

Roman Stem. Medium in size, round ovate; whitish yellow, with a faint brownish blush; stalk one-half to three-fourths of an inch

- long, with a fleshy protuberance at insertion; cavity shallow; basin narrow, slightly plaited; flesh tender, juicy, mild sub-acid, good flavor. Keeps through winter. A New Jersey fruit which succeeds well throughout the Ohio Valley and Middle States. Hardy far West.
- Romna.** Medium, oblate; greenish yellow, dull red blush; cavity deep, basin wide, shallow; flesh firm, mild sub-acid, juicy, good. Winter. Fig. 465.
- Rosenhager.** Medium, round; partly yellow, nearly covered with bright red; cavity medium, deep, stem medium, basin shallow; flesh white, mild sub-acid. Late winter. Fig. 460. Russian.
- Roxbury Russet.*** (Boston Russet, Putnam Russet of Ohio.) Medium or large, roundish-oblate, remotely conical; partly or wholly covered with rather rough russet on greenish yellow ground, sometimes a dull brown cheek; stalk one-half to an inch long, cavity acute; basin round, moderate; flesh greenish white, rather granular, slightly crisp, with a good sub-acid flavor. Keeps late in spring. Large specimens become conical, with short thick stalks; small specimens are more flat, and with longer and more slender stalks. Growth spreading, shoots downy. Although not of the highest flavor, its productiveness, uniformly fair fruit, and long keeping, render this variety one of the most profitable for orchard culture. It succeeds well throughout the Northern States, but partially fails in a few localities at the West. Fig. 431. Mass.
- Sandy Glass.** Large, regular, oblate; green; cavity acute; basin very wide; shallow, regular; stem short; flesh yellow, firm, sub-acid; quality very good, and best for culinary use. Season, winter. Fig. 421. Russian.
- Streintown.** Medium, ovoid conical; greenish, blush on side; flesh white. A good cooking apple. Winter. Pennsylvania.
- Swaar.*** Rather large, roundish, slightly flattened at the ends, often considerably oblate, sides regularly rounded, crown as wide as base; color greenish yellow, becoming a rich yellow, sometimes faintly russeted, and a small blush near the base, when much exposed to the sun; stalk rather slender, three-fourths of an inch long; cavity round, moderate, or often small; basin small, even; flesh yellowish, fine-grained, compact, tender, with a very rich, mild, aromatic, agreeable, slightly sub-acid flavor. Esteemed by some as the finest winter table apple. Ripens through winter and keeps into spring. Shoots ascending, buds large, leaves coarsely rounded serrate. Fruit apt to be scabby on old overloaded trees. Not successful in all localities. Fig. 480. New York.
- Tewksbury Blush.** (Tewksbury Winter Blush.) Small, round oblate; yellow with a red cheek; flesh yellow, juicy, with a good flavor. Keeps till midsummer. Very productive. New Jersey.
- Virginia Greening.** Large, oblate; skin yellowish, with large brown dots; stalk and cavity large; calyx open, basin large, abrupt; flesh yellow, coarse, with a rather pleasant sub-acid flavor. A good keeper. Southern.

Western Spy. Large, round-ovate, very regular and even, with a beautiful red cheek on a lemon yellow skin; stem short, in a small cavity; flesh yellowish white, sub-acid, of a fine flavor—hardly first-rate. Proved as yet only at the West.

White Pippin.* (Canada Pippin.) Large, roundish, oblong, flattened at ends; light greenish yellow; cavity large; basin abrupt, furrowed; flesh yellowish white, sub-acid. Good, but not very rich. Winter. Fair and productive, valued at the West and Southwest. Fig. 473.

White Rambo. Rather large or medium, roundish-oblate, remotely conical; skin greenish yellow, becoming yellow; cavity large; basin wide; flesh yellowish, with a mild sub-acid, "very good" flavor. Early winter. Ohio.

White Spanish Reinette. (Reinette Blanche d'Espagne.) Very large, roundish, oblong, slightly conical, somewhat angular, ribbed; yellowish green in the shade, rich brownish red next the sun; stalk short, cavity small and even; calyx large, open; basin deep, angular; flesh yellowish white, crisp, flavor rich sub-acid. Growth of tree and fruit resemble that of Fall Pippin, but it keeps longer.

White Winter Pearmain.* Rather large, conical, angular or ribbed; light yellowish green, with a brownish red cheek; stem short; flesh whitish, fine-grained, with a mild sub-acid, rich, fine flavor. This is distinct from the Michael Henry Pippin, which it resembles, and at the West is one of the best and most productive winter apples. Fig. 472.

Winter Cheese. (Green Cheese.) Medium in size, oblate; green in the shade, red in the sun; flesh very crisp, very tender and delicate, sprightly, and of a fine, pleasant flavor. One of the most highly esteemed early winter apples of southern Virginia, closely resembling the Fall Cheese, but a longer keeper. Becomes mealy and insipid after maturity.

Winter Pippin of Geneva. Large, oblate, slightly angular; yellow, with crimson cheek sparsely covered with gray dots; stalk small, cavity narrow; calyx open, segments long; basin open; flesh yellow, tender, vinous, excellent. Ripens through winter. Tree and fruit resemble Fall Pippin. (C. Downing.)

Wood's Greening. Large, roundish, little oblique, slightly flattened, obscurely conical; pale green, smooth; stalk very short, cavity acuminate; calyx rather large, basin distinct, slightly plaited; flesh greenish white or nearly white, fine-grained, slightly crisp, tender; flavor very agreeable, mild sub-acid, first-rate, but not very rich.

Yellow Bellflower.* (Bellflower, Yellow Belle Fleur.) Large, often quite large, oblong-ovate, apex quite narrow and conical, more or less irregular; surface pale yellow, often with a blush; stalk slender; basin ribbed; seeds long; flesh very tender when ripe, fine grained, crisp, juicy, acid, becoming sub-acid, excellent. keeps through winter. Shoots yellowish, rather slender; growth

of the tree rather upright; succeeds best on rather light soils. Adapted to the climate of the Northern and Middle States, as far south as Kentucky, but fails by premature dropping in many localities. More tart and less rich in cold summers, and far North. Hardy at the West. Fig. 481. New Jersey.

Yellow Newtown Pippin.* Medium, or rather large, roundish, oblate and oblique, more or less flattened; yellow, with a brownish red cheek, purplish before ripe; stalk very short; flesh firm, crisp, with a rich, mild flavor. Closely resembles the Green Newtown Pippin, and believed by many to be identical, differing only by a warmer exposure. It is fairer in some localities than the Green, but is usually inferior to it in flavor. C. Downing gives the following distinguishing points between these two sub-varieties: "The Yellow is handsomer, and has a higher perfume than the Green, and its flesh is rather firmer and equally high flavored; while the Green is more juicy, crisp, and tender. The Yellow is rather flatter, measuring only about two inches deep, and it is always quite oblique—projecting more on one side of the stalk than the other. When fully ripe, it is yellow, with a rather lively red cheek and a smooth skin, few or none of the spots on the Green variety, but the same russet marks at the stalk. It is also more highly fragrant before and after it is cut than the Green. The flesh is firm, crisp, juicy, and with a rich and high flavor." Fig. 482.



FIG. 478.
Swaar.

FIG. 479.
Yellow Bellflower.

FIG. 480.
Yellow Newtown Pippin.

Zukoff's Winter. Large, irregular conical, greenish, nearly covered with dark red; cavity medium, basin small; flesh white, sub acid, juicy, quality good. Mid-winter. Fig. 462. Russian.

DIVISION IV. CRAB APPLES.

Crabs belong to an entirely distinct branch of the Apple family, the type of the former being the well-known Siberian Crab, *Pyrus baccata*, while all our common apples are varieties of *Pyrus malus*. Hybrids of the two are freely produced, and of recent years many new sorts have been introduced, some of divided merit and beauty. The common idea concerning Crab apples is that they are pretty miniature apples of more or less astringency and fit only for making jellies and preserves. The following descriptions show that they vary from less than one to over two inches in diameter—that they are sweet, sub-acid, acid, and bitter. It is probable their great hardness will make the choicer varieties valuable for cultivation in the extreme North.

Cherry. Very small, round oblate; light yellow, red blush, dots small; stem very long, slender; cavity narrow, shallow; calyx small; basin narrow, very shallow. Flesh yellow, juicy, sub-acid astringent. August. Fig. 484.

Dartmouth. Large; crimson and orange, with a light brown, handsome; sub-acid. Tree vigorous and productive. Late.

Excelsior. Very large, roundish-oblate; stem long and slender; skin yellow, shaded and splashed with red, sprinkled with many russet dots, handsome; flesh white, juicy, good. Early. Minnesota.

Florence. Large, very handsome, hardy dwarf. Bears early and profusely. Western.

Gibb. Large, round oblate; bright orange yellow, flushed in sun; stem short, thick; cavity wide, deep; calyx medium, open; basin very wide, shallow, ribbed; flesh deep yellow, firm, crisp, juicy, sub-acid. Tree vigorous, hardy, and productive. One of the best. Autumn. Fig. 482. Wisconsin.

Gideon. Large, oblate conical; light yellow; stem long, slender; basin narrow, shallow; calyx medium; cavity narrow, deep; flesh yellowish white, tender, juicy, sub-acid, good. Autumn. Fig. 483. Minnesota.

Hyslop.* Large, round; in clusters; bright, deep crimson, blue bloom; sub-acid, only fair quality, handsome. Tree very hardy and vigorous. October. The most popular variety.

Hewes. *Cider Crab.* Small, round, dull red, juicy, acid. Good for cider only.

Lady. (*Lady Elgin*). Rather large, whitish and red, juicy, sub-acid. Late. Illinois.

Lady Finger. Large, oblong ovate, ribbed; light yellow, covered with bright red; stem long, slender; calyx small; basin narrow, shallow; flesh yellowish, tender, juicy, brisk acid, good. Late autumn. Fig. 485. Kansas.

Looker Winter. Large, oblate; yellow with red cheek; juicy, sub-acid. Late keeper.

Martha.* Medium, oblate; yellow with a red cheek; acid, good. Season early. Minnesota.

Marengo. Medium, round; yellow, bright red over; crisp, sub-acid. Keeps all winter. Illinois.

FIG. 483.—Gideon.

FIG. 481.—Orange.

FIG. 485.
Lady Finger.

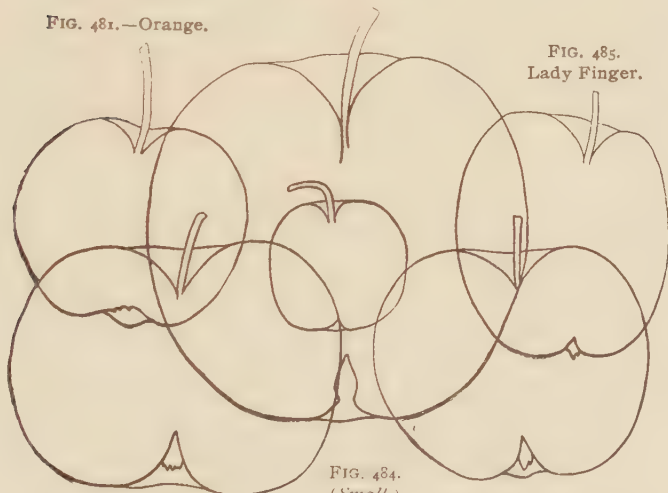


FIG. 482.—Gibb.

FIG. 484.
(Small.)
Cherry.

FIG. 486.—Van Wyck.

Minnesota. Very large, roundish, irregular; skin pale yellow; shaded or marbled with red and with russet dots, covered with a thin, white bloom; flesh juicy, crisp, mild, good. Late. Minn.

Montreal Beauty. Large, round-obovate, bright yellow, shaded red; flesh yellowish white, firm, acid. Fair. Tree a free grower and very ornamental. Late.

Orange. Medium large, round; yellow; flesh crisp and juicy. Tree a slow grower, free bearer. Ripens late. Fig. 481.

Paul's Imperial. Medium, yellow, nearly covered with bright red, acid. Ripens early. Tree vigorous.

Quaker Beauty. Large, in clusters; yellow, with crimson cheek;

very mild. Tree a strong grower, hardy, productive. West Winter.

Queen's Choice. Medium, round; bright crimson; flesh white, brisk flavor, handsome. Tree vigorous and prolific. Ornamental. Late.

Red Siberian.* Medium, about an inch in diameter, round-oblate; yellow, one side scarlet. A free-growing, handsome tree, but the fruit not so good for culinary purposes as larger varieties. France.

Richland Sweet. Large, conical; bright red; juicy, sweet, and rich. Tree a handsome grower and profuse bearer; does not blight. Winter.

Snyder. Large, oblate conical; yellow, splashed and striped carmine; dots medium, yellow; flesh yellowish, juicy, sub-acid. September. Wisconsin.

Sweet Russet. Large, round, inclined to conical, yellow russeted.

Sylvan Sweet. Very large, bright red, tender, juicy, and sweet. Wisconsin.

Transcendent.* Medium large, round; yellow striped with red; flesh crisp, juicy, good. Tree vigorous and productive. Said to blight badly. Early.

Van Wyck. Large, round conical; whitish, shaded light red; dots small; stem long; basin medium, shallow; cavity narrow, deep, russeted; flesh yellowish, very sweet, moderately juicy, good. Early. Fig. 486. New York.

Whitney.* Medium large, roundish, very good, handsome, rich. Very hardy. Illinois.

Yellow Siberian.* Medium, round, golden yellow. Vigorous grower. Early.

CHAPTER XIX.

THE APRICOT.

It is remarkable that a fruit of such excellence as the apricot, and ripening from one to two months before the best early peaches, should be so little known. In its natural character, it is more nearly allied to the plum than the peach, resembling the former in its broad leaf, and in the smooth stone of its fruit; but downy like the peach, and partaking largely of its flavor and excellence.

The apricot is budded on seedling apricots, and on peach and plum stocks. Plum stocks are preferred, and are more especially adapted to heavy soils; on light soils the hard-shelled almond and the wild plum have proved excellent.

The soil should be deep and dry. Young trees have frequently perished from a wet sub-soil, even where the surface is not unusually moist. On suitable soils, the tree is as hardy as most early peaches, but its greatest drawback is that it blossoms so early as to be caught by frost, and the young fruit is very attractive to the curculio. The trees have been commonly planted in the warmest situations, as on the warm side of buildings, or other sheltered site, facing the hot sun, where they have blossomed early, and, as a consequence, the crop has not unfrequently been destroyed by vernal frosts. Hence, a northern or more exposed aspect would be far preferable. If trained on a building, the eastern side should be especially avoided, as a hot morning sun upon frosted buds would be nearly certain destruction.

The liability to the attacks of the curculio, and the very common destruction of the whole crop by this insect, have contributed to the general conclusion that the apricot is not suited to our northern climate. Several cultivators, as far north as forty-three degrees of latitude, by a systematic destruction of

this insect, and by selecting a dry sub-soil, are able to obtain heavy crops of this delicious midsummer fruit.

More recently varieties from southern Russia have been introduced, which, so far as hardiness and vigorous thrifty growth are concerned, appear to have advantages over the older kinds in cultivation. But thus far in producing satisfactory crops of fruit for market purposes, apricots east of the Rocky Mountains neither North nor South have been very successful except with a few skilful growers.

By careful management, of which it is surely worthy, sufficient for family use may be obtained wherever the fruit will grow, but that apricots may be expected to be about as productive as the peach, as one prominent authority has recently stated, unless indeed in a few favored localities, is hardly probable. The following varieties are the most worthy of cultivation:

VARIETIES.

Alexander. Medium, oblong, orange yellow, spotted red, sweet, juicy, early. Good. Prolific. Freestone. Russian.

Alexis. Large, yellow, red blush, sub-acid, rich and good. Does well in West. Ripens about July 15th. Russian.

Black. (Purple Apricot, Noir, Violet.) Small or medium, round; pale red where densely shaded, dull deep purple or nearly black in the sun; surface with a thin down; flesh red near the skin, yellowish at the stone, somewhat fibrous, sweet, slightly astringent, with a pleasant, good flavor, inferior to the common apricots in quality. Kernel sweet; adheres to the stone. Hardy as an apple-tree, and very productive. A distinct species (*A. dasycarpa*) from the other apricots. Ripens with the Breda. Reproduces itself from the stone. There is another quite different apricot, called Violet or Red Angoumois; small, oblong, lighter red, free from the stone.



FIG. 487.—Breda.

Blenheim. (Shipley.) Large, oval, surface orange; flesh deep yellow, juicy, rather rich. Stone roundish, not perforate. Kernel bitter. A popular variety for canning in California.

Breda.* (Holland, Amande Aveline.) Rather small, sometimes nearly medium (an inch and a half diameter), roundish, obscurely foursided, suture distinct; surface orange, with a dark reddish orange cheek; flesh deep orange, free from the stone,

rich, and high flavored. Sweet kernel. Quite early, or a week or two after midsummer. Hardy for an apricot, and very productive. Fig. 487. Africa.

Brussels. Size medium, rather oval, compressed; pale yellow, dotted white in the shade, russety brown to the sun; suture deep at base; flesh yellow, rather firm, moderately rich. Rather late.

Budd. Small, oblong, yellow with fine red cheek; sweet, juicy, rather fibrous. Good. Ripens early in August. Russian. Too small for market.

Burlington. Rather large, oblong, suture distinct; skin golden yellow, dotted red, and a blush to the sun; flesh yellowish, sweet, good. Last half of July. New Jersey.

Dartmouth. Medium, an inch and a half in diameter, round; dark crimson and orange, with light bloom. Quality very good. Tree a free grower.

Early Golden.* (Dubois' Apricot.) Small, an inch and a fourth in diameter, round-oval, nearly smooth; suture narrow, distinct; surface wholly pale orange; flesh orange, moderately juicy, sweet, good, free from the stone. Kernel sweet. Early, or ten days before the Moorpark. Hardy, very productive, profitable for market. Origin, Dutchess County, N. Y.

Early Moorpark. Medium large, round orange, compressed, very good. Ripens about three weeks earlier than Moorpark.

Gibb.* Medium, roundish, very light yellow, sub-acid, juicy, good. Ripens early. Russian. Freestone.

Harris. Medium, roundish oval, flattened, suture distinct, bright yellow, red cheek, juicy, good. Hardy, productive. Ripens middle of July to first of August. New York.

Hemskirke.* Large, roundish, compressed; surface orange, with a red cheek; flesh bright orange, rich, juicy, sprightly. Kernel bitter. Stone rather small. Resembles Moorpark, but smaller: a little earlier, and stone not perforate. English.

Lafayette. Very large, oval, light yellow, marbled red in the sun; flesh high flavored and excellent. Ripens in August.

Large Early. Size medium, oblong, compressed, suture deep, slightly downy; pale orange, with a spotted bright orange cheek, very handsome; flesh free from the stone, pale orange, rich, juicy. Ripens at or a little before midsummer. Fig. 488. South of France.

Montgamet. (Alberge de Montagmet.) Small, roundish, slightly compressed; deep yellow; flesh reddish, firm, with a rather brisk flavor; stone compressed. Early. Leaves with stipules. One of the best for preserving.

Moorpark.* (Anson's, Dunmore's Breda, Temple's.) Large, two inches in diameter, nearly round, slightly compressed; surface orange, with a deep orange-red cheek, and with numerous darker dots; flesh free from the stone, bright yellowish orange, rather firm, quite juicy, with a rich, high flavor. Kernel bitter. Stone

perforate, or with a hole lengthwise under one edge, so that a pin may be thrust through. Season medium, or two weeks after midsummer. The tree is somewhat tender and the fruit ripens unevenly in most places, which has led to its rejection in many parts of California. English. Old.

Musch. (Musch-Musch.) Rather small, round, deep yellow, with a slight orange-red cheek; flesh yellow, translucent, tender, sweet. Tree rather tender. Little known in this country. Origin, Musch, in Asia Minor.

Orange. (Early Orange. Royal Orange. Royal George, Persian, Royal Persian.) Size medium, roundish, suture distinct, deep at base; surface orange, often a ruddy cheek; flesh dark orange, half dry, partly adhering to the stone—dry and poor unless house ripened. Stone small, roundish. Kernel sweet. Culinary. Ripens at midsummer.



FIG. 488.—Large Early.

Peach.* (Anson's Imperial, Pêche, De Nancy.) Very large, slightly larger than Moorpark, roundish; yellowish orange, with a brownish orange cheek, and mottled with dark brown to the sun; flesh rich yellow, juicy, with a rich, high flavor. Kernel bitter. Stone perforate. Ripens about the time of the Moorpark, which it closely resembles, but is of larger size. Origin, Italy.

Red Masculine. (Early Masculine, Brown Masculine, Abricotin, Abricot, Precoce, Abricotier Hatif.) Small, nearly round, suture distinct; bright yellow, with deep orange cheek and red spots; flesh yellow, slightly musky, sub-acid. Stone thick, obtuse at ends. Kernel bitter. Flowers rather small. Very early or about midsummer. Hardy for an apricot. Valuable only for its earliness.

Ringgold. Large, roundish, slightly oblong; light orange, darker in the sun; flesh yellow, juicy, excellent. Ripens soon after the Orange. Georgia.

Roman.* (Abricot Commun.) Medium in size, rather oval, compressed, suture small or obscure; surface pale yellow, with a few red dots to the sun; flesh very fine grained, half juicy, with a mild pleasant flavor. Kernel bitter. Worthless in England, but greatly improved by our warm summers. Productive. Season rather early or medium, or two weeks after midsummer. It is disseminated in this country under various erroneous names. The Blotch-leaved Roman differs only in the yellow spot or stain of its leaves.

Royal.* Rather large, round-oval, slightly compressed, suture shallow; dull yellow, faintly reddened to the sun; flesh pale orange, firm, juicy, sweet, high flavored, slightly sub-acid, free from the large, oval, nearly impervious stone. Ripens a week before Moorpark, smaller than the latter, and with a less bitter kernel. French. A profitable market variety, particularly in California.

Texas. Small, round, dark maroon; flesh juicy and pleasant, astringent at stone; clingstone. Athens, Ga.

Turkey. Size medium, round, not compressed; surface deep yellow, with a mottled, brownish, orange cheek; flesh pale yellow, firm, juicy, with a fine mixture of sweet and acid; very free from stone. Rather late, or middle of August. Somewhat resembles Moorpark, but differs in being rounder, paler, with an impervious stone, and sweet kernel.

The Blotch-leaved, or Golden Blotched, is identical with the preceding, with a yellow spot on the centre of each leaf.

Turkish of Western New York. Large, oval, compressed, orange-yellow shaded red. Productive. This is undoubtedly a different variety from the old Turkey.

White Masculine. (White Apricot, Early White Masculine, Abricot Blanc.) Small, roundish; nearly white, rarely a faint reddish cheek, rather downy; flesh white, delicate, a little fibrous, adhering to the stone. Kernel bitter. Closely resembles the Red Masculine, except in color and being rather better, and four or five days later.

CHAPTER XX.

THE BLACKBERRY AND DEWBERRY.

THE Blackberry requires nearly the same treatment as the Raspberry; but being more a rampant grower it should have more room, and needs more pruning or pinching. The distances of the rows may be six to eight feet apart, and the plants, if kept single, two feet in the row. Sometimes they are allowed to grow thickly or in a continuous line, in which case they should be kept well cultivated and properly pruned.

Constant cultivation is always better than much manuring.

Pruning the blackberry is commonly but little understood. We hear complaints of the rambling and straggling growth of this bush, extending across alleys, tearing dresses, at the same time proving unproductive. This is owing to a neglect of summer pruning. As soon as the new shoots have reached two and a half or three feet in height, the ends should be pinched off with the thumb and finger, which will cause the protrusion of laterals. These in turn may be pinched off when they have grown from twelve to eighteen inches. As soon as the fruit is off (or the operation may be delayed until winter) the canes which have fruited should be cut off at the ground. In the mean time, three to five new canes have been allowed to grow for fruiting the following season. That is, blackberry canes fruit but once (the second year), and the old canes choke the plant, take its strength, and afford breeding places for insects and fungi. The old canes should be burned to destroy diseases and insects.

The Dewberry is much like the blackberry in fruit, but the canes are trailing. The fruits are earlier than blackberries, and therefore prolong the blackberry season. Cut out the canes, as in blackberries. To facilitate cultivation, tie the growing canes to stakes (one stake for each hill). Cut the

cords in late fall, and let the canes lie on the ground for winter protection. Tie up again in the spring.

COVERING BLACKBERRIES.—The following mode of covering is described in *The Country Gentleman*, by Amos Fish, of Bethlehem, N. Y., and is adapted to cold regions:



FIG. 489.—Ancient Briton Blackberry. (See Index.)

“At the approach of winter remove the stakes and lay the bushes at right angles from the rows, flat on the ground, and cover them two or three inches deep with earth, as follows: Cut off the limbs within one and a half inches of the canes, at the right and left hand sides of the row, making flat bushes. ‘Shorten in’ the remaining limbs by cutting off the slender ends; then, with a digging or dung fork, loosen the earth about the roots, and remove some, laying the roots loose on one side, so that in laying down the roots shall be bent instead of the canes

being broken. When laid down use bricks to hold them down while covering, and remove the bricks when in the way. The bushes should be raised up and the stakes replaced as early in the spring as the frost is out of the ground, which can be easily done with a fork if the rows are laid down singly instead of lapping over one another.”

BLACKBERRY VARIETIES.

Agawam. Medium to large, round-oblong, bright black, juicy, sweet; flavor excellent. Canes generally stout, sometimes drooping. Productive, hardy, suckers freely. Season early.

Ancient Briton.* Large, oblong to oval, sweet, very good. Mid-season, ripening with Snyder. Bush a sturdy grower, hardy and one of the most productive. A standard variety in many places, particularly in the middle West. Fig 489. Wisconsin.

Dorchester. Rather large, oblong (sometimes an inch and a fourth long), nearly sweet, color shining black. It bears carriage well. Vigorous, productive, ripening at the North the first of August. Fig. 490. Massachusetts. The first cultivated variety.

Early Cluster.* Canes erect, healthy, and remarkably productive; berries medium, short-oblong, sweet, without a hard core, very good. Entire crop ripens within a few days of first picking. One of the best very early varieties, equal if not superior to Early Harvest.



FIG. 490.—Dorchester.



FIG. 491.—Kittatinny.

Early Harvest.* Medium, round-oblong, tender, very juicy, sweet very good. Canes red, moderately vigorous; thorns few, small. Season very early. Good. Illinois.

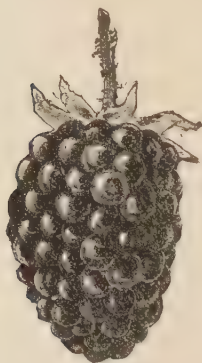
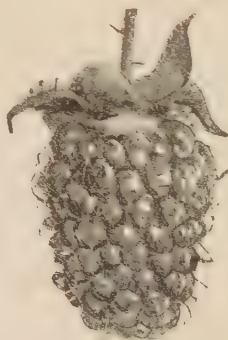


FIG. 492.—Lucretia Dewberry.

FIG. 493.—Loganberry.
(See Index.)

Erie. Large, nearly globular, not very sweet, but good. Canes vigorous, upright, branched, green, tinged with red. Very productive and largely grown for market. Winter kills. Pennsylvania.

Kittatinny.* Large, sometimes an inch and a half long, oblong ovate, glossy black; flesh moderately firm, nearly sweet, rich.

excellent. Canes very vigorous. Quite hardy, very productive, medium late. One of the best family blackberries. The berries become duller in color after picking and less showy in market. Fig. 491. New Jersey.

Loganberry. Probably a cross between the Western dewberry and an unknown variety of the European red raspberry. Originated by Judge J. H. Logan, Santa Cruz, Cal., in 1882. Has the dewberry habit of growth and propagates by tips, its principle resemblance to the raspberry being in color and flavor. Berries very large, very long (often $2\frac{1}{4}$ inches) shining; not high flavored



FIG. 494.—Snyder.

but good. Season early, with the raspberries. Not hardy in the North unless the vines are covered. Appears promising in some sections.

Lucretia Dewberry.* Large, coreless, glossy black, juicy, sweet; ripens a fortnight earlier than Wilson's Early. Vine vigorous, procumbent, thorny, hardy, but does better if lightly covered in winter. The best dewberry yet introduced. Fig. 492. Texas.

Mayes Dewberry (Austin). Plant trailing when young, more upright when old; productive; fruit very large, oval-conic, handsome, of good quality. Very early. Very promising in the middle West. Texas.

Mersereau.* A selected strain of Snyder, to which it is superior by being larger, of better quality, and less liable to turn red after being picked. Very promising. New York.

Minnewaska. Large, nearly round, juicy, sweet. Canes branched, shaded red, thorny. Winter kills. Mid-season. New York.

Missouri Mammoth. Large, black, firm, sweet. Hardy, productive. Not entirely hardy north of New York. Missouri.



FIG. 495.—Wilson.

Newman. Rather large, oval, quality very good. Canes of moderate growth, nearly free from spines. Early August. Sometimes productive, usually not. Ulster County, N. Y.



FIG. 496.



FIG. 497.

New Rochelle. (Lawton.) Large, oblong-oval, black, soft and sweet when fully ripe. Middle of August. Canes tender in severe climates. New Rochelle, N. Y. The second variety introduced into cultivation.

Snyder.* Medium, oblong-oval, juicy, sweet, fine flavor. Canes strong, upright, thorny. Very productive and extremely hardy. A standard market variety. Fig. 494. Mid-season. Indiana.

Taylor.* Canes a peculiar greenish-yellow, moderately vigorous, productive; berries medium large, oblong, juicy, sweet; very good. One of the very best late dessert or market varieties. Very hardy. Indiana.

Wilson.* Very large, oblong-oval, black; quality good. Canes tender at the North, hardy as far south as Philadelphia, where it is very productive. Introduced in 1854 and still largely grown. Early. Fig. 495. New Jersey.

Wilson, Jr. Medium to large, very juicy; good. Canes moderately vigorous, thorny. Good in New Jersey and South. Winter kills north of New York. Origin in New Jersey, 1875. Can hardly be distinguished from Wilson.

CHAPTER XXI.

THE CHERRY.

PROPAGATION.—The cultivated varieties of the Cherry consist of two distinct classes of sorts: the first, comprising the Mazzards, Hearts, Bigarreaus, and Dukes, is characterized usually by the tall, upright growth and pyramidal form of the tree, by the large, vigorous, and straight young branches, and by a sweet or bitter, but not a sour, taste. The second class, or round-fruited, including the Morelloes, Kentish, and the common pie cherry, has small, irregular, and thickly growing branches, and a decidedly acid fruit. Observation will soon enable any one to distinguish these two classes, even where the trees are not more than a foot in height. It is the former only that are commonly used as stocks for grafting and budding, on account of their straight and rapid growth. Attempts are not unfrequently made to propagate the common cherry on the wild Black Cherry (*Prunus Virginiana*), or on the Choke Cherry (*P. serotina*). Such attempts prove to be failures, the sorts being too dissimilar in their natures to favor union. These two species, it will be observed, have racemose inflorescence, while in the cultivated cherry the flowers are simply in fascicles or umbels. Some of the wild species (as the Sand and Pin cherries, *P. Besseyi* and *P. Pennsylvanica*) having the latter kind of inflorescence, have been successfully used as stocks, and their adoption might possibly prove useful at the South and West, where the Heart cherries fail. In the East, at least, the Mahaleb cherry (*P. Mahaleb*), is now extensively used as stocks. The stocks are mostly imported.

The stones, as soon as they are taken from the fruit, should be dried only enough to prevent mouldiness, and then mixed with an equal quantity of clean moist sand. The best way to keep them till spring is to bury them in shallow pits on a dry

spot of ground, covering them with flat stones and a few inches of earth.

The seed may be planted in autumn or spring. If in autumn, the ground should be dry, and entirely free from all danger of becoming flooded or water-soaked. Unless the soil is quite light, the surface should be covered with leaf mould or pulverized manure, to avoid the formation of a hard crust upon the surface, which would prevent the young plants from breaking through. But usually spring is the best season, if the planting is done the moment the frost is out of the ground; for the seeds sprout and grow on the first approach of warm weather. The distance should be the same as for the peach and apple; and nearly the same directions are applicable to their management in the nursery rows.

Good seedlings, averaging a foot and a half high, may be transplanted from the seed-beds when a year old, and if well cultivated in good soil, may be budded the same season. Where the buds fail, the trees may be grafted in the following spring.

Budding can only succeed with thrifty, freely growing stocks and with well-matured buds. About the time, or a little after the most vigorous stage of growth, or just as the terminal buds on the shoots *commence* forming, is the best period. If earlier, the buds will usually be too soft; if later, the bark will not peel freely, nor the buds adhere well. This period usually commences about midsummer, and continues, under the various influences of season and soil, for two or three weeks, and sometimes more than a month. Success will be found to depend also upon cutting out with the bud a larger portion of the wood than is common with other budding, or equal to one-third the diameter of the shoot. This will be found particularly useful where the buds are slightly immature, retaining in them a larger portion of moisture, and preventing their curling off from the stock.

Difficulty is often experienced in successfully grafting the cherry. It succeeds well, if performed very early in the spring, before the slightest swelling of the buds, and before the frost has disappeared from the ground. After this period it is very liable to failure.

In propagating the slower-growing, sour-fruited varieties.

good trees are often soonest obtained by grafting or budding them at standard height on large straight stocks. If grafted, they soon form a handsome head; if budded, care must be taken by judicious pruning to prevent the young shoots from growing all on one side.

Pruning the cherry, except to form the head, is rarely needed.

SOIL.

The cherry being a very hardy tree, will thrive in the Northern States in nearly all good soils. But a dryer soil than for most other species is found preferable; a sandy or gravelly loam is best. In wet places, or on water-soaked subsoils, it does not flourish, and soon perishes.

DWARF CHERRIES.

These are, as yet, cultivated to a limited extent in this country. They are chiefly adapted to village gardens, or other grounds of limited extent, as they may be set as near each other as five or six feet. They may be easily covered with netting, and thus protected from the birds; and what is most rare and desirable, the fruit permitted to remain until fully ripe, so important to the flavor of all cherries of an acid character.

The stocks used for this purpose are the Mahaleb (*Prunus Mahaleb*), which also possesses the advantage of flourishing on heavy clay ground. The buds usually grow quite vigorously, their branches being so pruned that seven, nine, or more may come out from the centre of the plant, like a well-managed gooseberry bush. These branches will put forth early in summer, as in pyramidal pears, several shoots at their extremities, all of which must be pinched off to within two or three buds of their base, leaving the leading shoots untouched till near the close of summer, when they must be shortened to eight or ten buds. If trees on Mahaleb roots are allowed to grow at will, they are not much dwarfed as orchard trees. Systematic heading-in each year, as for dwarf pears, will tend to keep them dwarf.

The cultivation of dwarf cherries would greatly facilitate the use of net screens for covering entire orchards, as sometimes practised in Holland and England. The boundary fence is made of wire (or wood) lattice, so as to exclude small birds. At regular distances, through the inclosed area, are inserted into the earth wooden or tile sockets for the reception of poles or props to support the net. These poles have each a small circular board nailed on their tops, to prevent injury to the netting. The boundary fence is supplied with hoops, to which the net is readily attached. When the cherries begin to ripen, it is elevated on several of the poles, each carried by a man, and spread over the garden, the rest of the poles being easily inserted in their sockets afterward. All birds are thus completely excluded. During rain or dewy evenings, the net is stretched to its utmost extent. In dry weather it is slackened, and forms a festooned vault over the whole cherry garden. Its durability is increased by soaking it in tan once a year. Ten square rods of ground, comprised within a circle of fifty-nine feet in diameter, would contain forty dwarf cherry-trees at eight feet distance, or ninety trees at five feet distance.

Sometimes the cherry crop is much lessened by premature rotting of the fruit. This is due to a fungous disease. Pick the cherries before they are fully ripe, and when they are dry. Spraying with Bordeaux will help.

At the South and West the finer varieties of the Heart and Bigarreau cherries do not flourish. This is supposed to be caused by the hot sun upon the bark of the trunk, and by rapid growth preventing a sufficient hardening of the wood. The Mayduke, Early Richmond, and the Morelloes generally succeed well. Grafting the Heart varieties upon these hardy sorts has been found useful, and training the trees with low heads, or with but little bare trunk, is an additional security. The cracking and bursting of the bark at the West are partly prevented by these precautions; but the safest way is to confine the culture of this fruit to the sorts above named, which are least affected. Cherries of any kind are unsatisfactory in the Southern States, those only which are grafted upon Mahaleb stock giving any satisfaction.

SYNOPSIS OF ARRANGEMENT.

CLASS I. FRUIT HEART-SHAPED.

(Fruit inclining to sweet, tree vigorous and regular in growth.)

Heart and Bigarreau Cherries.

Section I. Fruit black, dark red, or crimson.

Section II. Fruit bright red, or lighter.

CLASS II. FRUIT ROUND.

Duke and Morello Cherries.

Section I. Fruit black, dark red, or crimson.

Section II. Fruit bright red, or lighter.

CLASS III.

Native Dwarf Cherries.

CLASS I. FRUIT HEART-SHAPED.

*Section I. Fruit black, dark red, or crimson.***Afghanistan.** Large, black, sweet; flesh firm; good shipper. Tree vigorous, prolific.**Black Eagle.** Rather large, obtuse heart-shaped, roundish, nearly black; stalk an inch and a half long, rather slender, slightly sunk; flesh dark, deep purplish crimson, with a very rich, high, excellent flavor. Season medium, after Tartarian. Shoot stout, diverging or spreading. A cross of the Graffion and May Duke. English. Not always of the highest character. A moderate bearer. Fig. 502.**Black Hawk.** Large, heart-shaped, often obtuse, sides compressed, surface uneven; color purplish black, glossy; flesh dark purple, rather firm, rich, high flavored. Last week of June. Dr. Kirtland, Cleveland, Ohio.**Black Heart.*** Medium or rather large, heart-shaped, slightly irregular; blackish crimson, becoming black; stalk an inch and a half long, moderately sunk; tender when ripe, with a high, "very good" flavor. Season medium, or rather early. Productive and hardy; growth rather erect, or with diverging shoots.

Davenport (or *Davenport's Early*) closely resembles **Black Heart**, but is a few days earlier, and the leaves are larger and lighter green.

FIG. 498.
May Bigarreau.

FIG. 499.
Knight's Early Black.



FIG. 500.
Early Purple Guigne.

FIG. 501.
Black Tartarian.

FIG. 502.
Black Eagle.

Black Tartarian.* (Frazer's Black Tartarian, Black Circassian, Black Russian, Ronald's Large Black Heart, Ronald's Heart.) Quite large (often an inch in diameter), on crowded old trees only medium; heart-shaped, often rather obtuse, surface slightly uneven; nearly or quite black; stalk an inch and a half long, slightly sunk; flesh dark, half tender, with a peculiar liver-like consistency, rich, nearly destitute of acid, with a very fine, mild flavor. Ripens early, or about the middle of June. Shoots very erect. The vigorous growth and great productiveness of the tree, and the large size and mild, sweet flavor of the fruit, render this variety a general favorite. Fig. 501. Russian.

Brandywine. Rather large, broad heart-shaped; crimson, mottled; flesh tender, slightly sub-acid, very good. Last of June. Origin, Wilmington, Del.

Brant. Large, heart-shaped; reddish black; flesh dark purplish red, sweet, half tender, juicy, rich. Middle of June. Cleveland, Ohio. Dr. Kirtland.

Conestoga. Large, obtuse heart-shaped; dark purple; stalk long, slender; flesh firm, with a rich, pleasant flavor. Lancaster County, Pa.

Cumberland Seedling. (Triumph of Cumberland.) Large, obtuse heart-shaped; purplish crimson; flesh firm, very good. Middle of June. Carlisle, Pa.

Early Purple Guigne.* Size medium, round heart-shaped, distinctly dotted when ripening; dark red, becoming nearly black; flesh dark, tender, juicy, rich, sweet. Growth less vigorous than most heart cherries; shoots dark brown, spreading; leaves rather small, drooping on long petioles. Very early, ripening first ten days in June. One of the best early cherries. Fig. 500.

Elkhorn. (Tradescant's Black Heart. Large Black Bigarreau.) Large, heart-shaped, surface slightly uneven; black; stalk rather short, or an inch and a fourth long; cavity rather deep; flesh solid, firm, not juicy, with a high, fine flavor, bitter before fully ripe. Rather late. Shoots dark gray.

Hoskins. Very large, round heart-shaped, dull purple; flesh dark mottled, firm, sweet. Seedling of Napoleon. Oregon.

Jocosot. Large, regular, heart-shaped, indented at apex; glossy, nearly black; flesh tender, with a sweet, rich flavor. Last of June. Ohio.

Kennicot. Large, oval heart-shaped; amber-yellow, mottled and shaded with bright red; flesh firm, rich, sweet. Early in July. Cleveland, Ohio.

Knight Early Black.* Large, obtuse heart-shaped, surface slightly uneven; black; stalk an inch and a fourth or an inch and a half long, rather stout; cavity deep, narrow; flesh dark purplish crimson, tender, juicy, with a very rich, high, excellent flavor. Ripens nearly with the Black Tartarian. Shoots diverging or spreading. Much resembles the Black Eagle, but larger, earlier, more heart-shaped, and with a *much deeper cavity*. English. In some localities it appears to need a rich soil and warm situation to develop its excellence. A moderate and sometimes poor bearer. Fig. 499.

Leather Stocking. Medium, heart-shaped; reddish black; flesh firm, sweet. Last half of July. Cleveland, Ohio.

Logan. Rather large, obtuse heart-shaped, indented at apex; purplish black; flesh rather firm, sweet, rich. Last half of June. Cleveland, O.

Manning Late Black. Large, roundish; deep purple or black; flesh purplish, half tender, sweet, excellent. End of June. Salem, Mass.

May Bigarreau. (Baumann's May of Downing, Bigarreau de Mai.) Rather small, oval heart-shaped, becoming as it ripens nearly round; color deep red, becoming black; stalk an inch and three-

fourths long, rather stout at the ends; cavity narrow; flesh dark crimson, juicy, rather sweet, not high flavored. Very early, or first ten days of June. Productive. Shoots diverging, brown, resembling in color those of the Mayduke. Fig. 489.

Mezel.* (Great Bigarreau, Great Bigarreau of Mezel.) Large, obtuse heart-shaped; surface uneven, dark red, becoming black; stalk long, slender; flesh rather firm, rich, very good. Late. Shoots slightly flexuous; tree great bearer. France.

Osceola. Rather large, heart-shaped; dark red, nearly black; flesh tender, sweet, very good. End of June. Cleveland, O. Dr. Kirtland.

Pontiac. Large, roundish heart-shaped; dark red, becoming nearly black; flesh half tender, sweet, and agreeable. Cleveland, O. Dr. Kirtland.

Powhatan. Size medium, roundish; dark purple, glossy; flesh purplish red, half tender, with a pleasant flavor. End of July. Cleveland, O.

Richardson. Large, heart-shaped; blackish red; flesh deep red, half tender, sweet. Last of June. Massachusetts.

Tecumseh. Rather large, obtuse heart-shaped; reddish purple; flesh dark red, half tender, with a rich sub-acid flavor. End of July. Cleveland, O.

Wendel Mottled Bigarreau. Medium or rather large, obtuse heart-shaped; dark red, becoming nearly black, mottled with dark streaks or points; suture a dark line on one side; stalk medium; cavity round, irregular; flesh firm, crisp, high flavored; stone small. Rather late. Growth upright. Albany, N. Y.

Werder Early Black Heart. Large, roundish heart-shaped; skin black; flesh purplish, tender, very good. First half of June.

Section II. Bright red or lighter.

American Heart.* Medium or rather large, four-sided heart-shaped; color light red or pink, mixed with amber; stalk nearly two inches long, slender; cavity small and shallow; flesh half tender, adhering to the rather tough skin, juicy, sweet, good. Very productive. Early.

Belle d'Orleans.* Rather large, roundish heart-shaped; light yellow, with pale red; flesh tender, with a sweet, excellent flavor. Middle of June. Tree a good grower. Productive. A valuable early sort.

Burr Seedling. Rather large, distinct heart-shaped, smooth; a fine deep clear red, often spotted or marbled; stem an inch and a half long; cavity moderate; flesh half tender (about as firm as American Heart, from which it probably originated), sweet, rich, with a fine flavor. Growth vigorous, very productive. Season medium. Origin, Perrinton, N. Y.

Carmine Stripe. Rather large, heart-shaped; a carmine line on the suture, amber yellow with bright carmine; flesh tender, agreeable. Last of June. Ohio.

Caroline. Rather large, roundish oblong; pale amber mottled with red; tender, sweet, delicate. Last of June. Cleveland, O.

Centennial. Large, yellow, marbled crimson, very sweet, good shipper. A seedling of Napoleon. Fig. 503. California.



FIG. 503.—Centennial.

juicy, sweet, rich. Season early, or with Black Tartarian. Origin, Cleveland, O.

Champagne. Medium, roundish heart-shaped; reddish pink; stalk medium, cavity shallow; flesh amber colored, sub-acid, rich. Last of June. Raised by C. Downing, Newburg, N. Y.

China Bigarreau. Medium in size, oval heart-shaped, somewhat roundish, suture distinct; color amber mottled with red, becoming red; stalk long, slender, cavity shallow; flesh half tender when ripe, with a rather rich and peculiar second-rate flavor. Season rather late. Shoots spreading. Origin, Flushing, L. I.

Cleveland. (Cleveland Bigarreau.) Large, round heart-shaped; suture broad and deep half way round; color bright, clear, delicate red on amber yellow; stalk an inch and a half long, curved; flesh firm, juicy, sweet, rich. Season early, or with Black Tartarian. Origin, Cleveland, O.

Coe's Transparent.* Size medium, nearly globular, very regular; skin thin, pale amber, reddened in the sun, with peculiar pale spots or blotches; stalk nearly an inch and a half long, moderately sunk; very tender, melting, sweet, excellent. Early, just before Black Tartarian. Growth thrifty. Origin, Middletown, Conn. One of the most valuable of all cherries for home use. Fig. 504.

Delicate. Rather large, roundish, oblate; stalk medium in length, cavity rather large; color yellow, mottled and shaded with carmine, translucent; flesh light yellow, flavor excellent. 1st of July. Tree spreading, forming a round head. Cleveland, O.

Doctor. Size medium, round heart-shaped; color light yellow and red, blended and mottled; stalk an inch and a half long; cavity round, regular; flesh white, tender, juicy, sweet, fine. Very early. Resembles American Heart, but two weeks earlier. Growth moderate, spreading leaves, narrow. Origin, Cleveland, O.

Downer.* (Downer's Late, Downer's Late Red.) Size medium, round heart-shaped, smooth; red, light amber in the shade; stalk an inch and a half long, slightly sunk; fruit in clusters; flesh tender, melting, rich, very high flavored—not good till fully ripe. Rather late. Growth erect. Hangs late, and does not rot easily. Origin, Dorchester, Mass. Fig. 506.

Downing's Red Cheek. Size medium or rather large, obtuse heart-shaped, regular; suture distinct; color with a broad crimson cheek; stalk an inch and a half long; cavity of medium size; flesh half tender, delicate, sweet, rich, very good. Rather early. Origin, Newburg, N. Y.

Downton. Large, round heart-shaped, apex quite obtuse, or slightly indented; light cream color, stained with red; stalk an inch and three-fourths or two inches long, slender; cavity wide; flesh yellowish, tender, adhering slightly to the stone, rich, delicious. Season medium or rather late. Growth rather spreading. Fig. 505.

Early Prolific. Medium, roundish heart-shaped; color bright red on yellow ground; stalk long, flesh half tender, very good. Early. Cleveland, O.

FIG. 504.
Coe's Transparent.

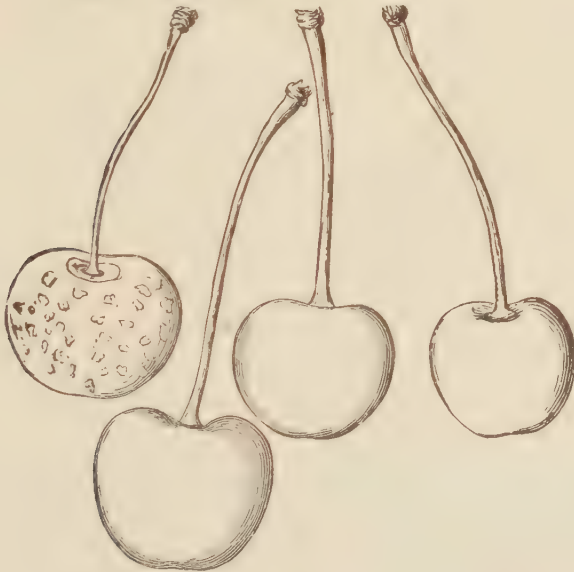


FIG. 505.
Downton.

FIG. 506.
Downer's Late.

FIG. 507.
White Heart.

White Heart. Medium, or rather small, heart-shaped, slightly oblong, often a little one-sided, suture distinct; color dull whitish yellow, tinged and spotted with pale red; stalk an inch and three-fourths long, cavity wide, shallow; flesh rather firm, tender when ripe, sweet, pleasant. Quite early. Growth erect. An old sort, now becoming superseded. Fig. 507.

Elliott's Favorite. Size medium, round, regular, slightly compressed; color pale amber yellow, with a bright, marbled, carmine-red cheek; stalk an inch and a half long; cavity even and regular; flesh pale amber, translucent, tender, delicate, juicy, with a sweet, fine flavor. Season medium, ripening with *Belle de Choisy*. Shoots vigorous, diverging. Origin, Cleveland, O.

FIG. 508.
Florence.



FIG. 509.
Elton.

FIG. 510.
Holland Bigarreau.

FIG. 511.
Bigarreau or
Yellow Spanish.

Elton.* (Flesh-Colored Bigarreau.) Large, pointed heart-shaped, somewhat oblong; pale yellow, blotched and shaded with red; stalk two inches long, slender; flesh firm, becoming rather tender, rich, high flavored; "very good." Season medium. Not desirable for market because of its light color, tender flesh, and liability to rot, but excellent for home use. English. Rather tender in very severe climates. Fig. 509.

Florence. (Knevett's Late.) Large, heart-shaped, regular, smooth; amber yellow marbled with red, and with a red cheek; stalk an inch and a half long; flesh firm, juicy, sweet; season rather late. Resembles Yellow Spanish, but hardly so large, and ten days later. Fig. 508.

Dr. Wiseman. Large, yellowish, shaded red; resembles Gov. Wood. Tree tender, does well in North Carolina.

Governor Wood.* Large, roundish heart-shaped; light yellow, shaded and marbled with light red; stalk an inch and a half long, cavity wide; rather tender, nearly sweet, rich, excellent. Early to mid-season. Tree vigorous, shoots diverging, forming a round head. Cleveland, O. As the trees grow older, they often overbear and yield a smaller and less excellent fruit—hence requiring thinning.

Hoadley. Rather large, roundish heart-shaped; light clear red on pale yellow; flesh tender, rich, sweet, excellent. Last week of June. Origin, Cleveland, O.

Hovey. Large, obtuse heart-shaped; amber, with a fine red cheek; stalk an inch long, deeply set; flesh rather firm, pale amber, "very good." Last half of July. Boston, Mass.

Hyde's Late Black. Medium, obtuse heart-shaped; purplish black; flesh half firm. First week in July. Newton, Mass.



FIG. 512.
Rockport.

FIG. 513.
Napoleon.

Kirtland's Mammoth. Very large, obtuse heart-shaped; rich red on bright, clear yellow; flesh rather tender, with a fine, high flavor. A moderate bearer. End of June. Cleveland, O.

Kirtland's Mary.* Quite large, round heart-shaped, regular, base somewhat flattened; color light and dark red, deeply marbled on a yellow ground; stalk an inch and a fourth to an inch and a half long; flesh light yellow, half tender, rich, juicy, sweet, high flavored. Season medium, or with the Elton. Origin, Cleveland, O.

Manning Mottled. (Mottled Bigarreau.) Medium or rather large, round heart-shaped, suture distinct; color amber, shaded and mottled with red; semi-transparent, glossy; stalk slender, cavity shallow; flesh yellow, tender when ripe, sweet, good. Stone rather large. Season, end of June. Shoots dark. Productive Origin, Salem, Mass.

Napoleon.* (Royal Ann.) Very large, regularly heart-shaped, remotely oblong; skin pale yellow and amber, spotted and shaded with deep red; stalk an inch and a fourth long; flesh very firm, juicy and sweet, very good. Rather late. Shoots with a light greenish cast. Growth rather erect, vigorous. Very productive, good for market, and especially valuable for canning. Fig. 513. Europe.

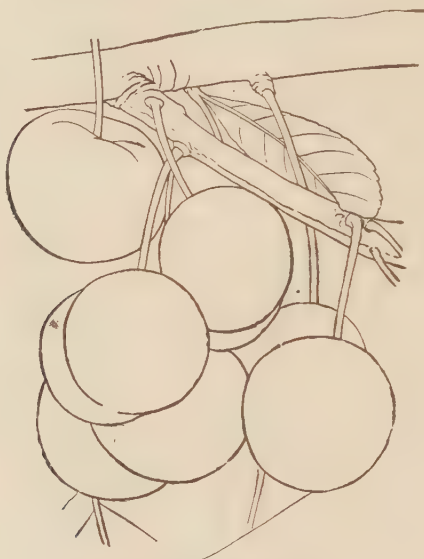


FIG. 514.—Windsor Cherry

The *Holland Bigarreau* closely resembles the above, and is thought by some to be identical.

Ohio Beauty. Very large, oblate heart-shaped; dark red on a pale red ground, somewhat marbled, very handsome; stalk an inch and a half long, rather stout; cavity wide and deep; flesh white, tender, juicy, with a fine flavor. Early, or about ten days before *Napoleon Bigarreau*, which it equals in size. Origin, Cleveland, O.

Red Jacket.* Large, obtuse heart-shaped; color light red; flesh half tender, with a good sub-acid flavor. Ripens with *Downer*. Keeps well without rotting. Cleveland, O.

Rockport Bigarreau.* Quite large-round heart-shaped; color, when fully ripe, a beautiful clear red, shaded with pale amber, with occasional spots; stalk an inch and a half long, cavity wide; flesh firm, juicy, sweet, rich, with an excellent flavor. Mid-season. Tree upright, vigorous. Origin, Cleveland, O.; one of the best of Dr. Kirtland's seedlings. Fig. 512.

Sweet Montmorency. Medium in size, round, slightly flattened at base, with a depressed point at apex; color pale amber, mottled with light red; stalk an inch and three-fourths long, slender; cavity small, even; flesh yellowish, tender, sweet, excellent. Season very late or past mid-summer. Approaches somewhat in character the Morello. Origin, Salem, Mass.

Townsend. Large, obtuse heart-shaped, high-shouldered, suture distinct; light amber with red; flesh rather tender, with a rich, pleasant flavor. End of June. Lockport, N. Y.

White Bigarreau. (Large White Bigarreau, White Ox-Heart.) Large, heart-shaped, tapering to obtuse apex; suture distinct; surface slightly wavy, yellowish white marbled with red; flesh moderately firm, or half tender, very rich and delicate. Season medium. A moderate bearer when young, more productive afterward; liable to crack after rain. Tree rather tender; growth spreading.

Windsor.* Tree upright, vigorous, a heavy bearer; fruit large, roundish oblong; very firm, yellow, nearly overspread with red; juicy, very good. One of the most desirable late cherries, especially for market or preserves. Ontario. Ripe at Fourth of July in New York. Fig. 514.

Yellow Spanish.* (Bigarreau, Graffion.) Very large, often an inch in diameter, obtuse heart-shaped, very smooth, regular, base flattened; surface clear, pale waxen yellow, with a handsome light red cheek to the sun; stalk an inch and three-fourths long; cavity very wide, shallow; flesh firm, with a fine, rich flavor. Season medium. One of the best and most popular of light-colored cherries. Fig. 511. Europe.
The *Late Bigarreau*, originated with Dr. Kirtland, of Cleveland, resembles this, but is slightly less in size, deeper red, and ripens about ten days later.

CLASS II. FRUIT ROUND.

Section 1. Fruit black, dark red, or crimson.

Archduke. (Portugal Duke, Late Archduke.) Very large, round heart-shaped, slightly flattened, dark shining red, becoming nearly black; stalk an inch and a half long, slender, deep sunk; flesh light red; when matured rich sub-acid, slightly bitter till fully ripe; of fine flavor, hardly equal in quality to May Duke. Mid-season. One-fourth larger than May Duke, and tree more spreading, and with thicker and darker foliage. Rare.

Donna Maria. Size medium, dark red; rich, acid. Late. Succeeds well at the West.

Early Morello. Size small, round-oblate, red, small pit, flesh firm, juice uncolored. A little earlier than Early Richmond.

Eugenie.* Medium large, round-obtuse, heart-shape; skin amber red; of the very best quality. Early. An excellent dessert variety which should receive more attention. France.

Late Duke.* Large, obtuse, roundish heart-shaped, slightly oblate, color light, mottled with bright red at first, becoming rich dark red when ripe; stalk an inch and a half long, rather slender; cavity shallow; flesh pale amber, sub-acid, not rich, much less so than May Duke; season very late, or a little after mid-summer. Tree more spreading than May Duke, and foliage rather more



FIG. 515.—Montmorency Cherry.

compact, approaching somewhat the character of a Morello. English.

Lewelling. Very large, black, round, heart-shaped; flesh firm, solid. Valuable.

Louis Philippe. Size medium, roundish; dark red; flesh red, acid, tender. Middle of July. French. Succeeds well at the West.

May Duke.* Large, roundish, obtuse heart-shaped; color red at first, becoming when mature nearly black; flesh reddish, becoming dark purple, very juicy and melting, rich, acid, excellent. It is frequently picked when red, immature, and not fully grown, and imperfect in flavor. Quite early, but often varying greatly and permanently in its season of ripening, even on the same

tree. Holman's Duke and Late May Duke are only late variations perpetuated by grafting. Growth upright for a Duke. Very hardy, and adapted to all localities. France.

Montmorency.* Large, round, bright red, acid. Tree hardy, great bearer; fruits early. A good market variety, especially valuable for preserving. There are several sub-varieties; that sold as Montmorency Ordinaire is usually considered the best. France.

Montmorency Ordinaire. Fruit medium large, round-oblato, dark rich red, tender, a fine acid; very good. Season early; a week after Early Richmond. A profitable market sort. France. Fig. 515.

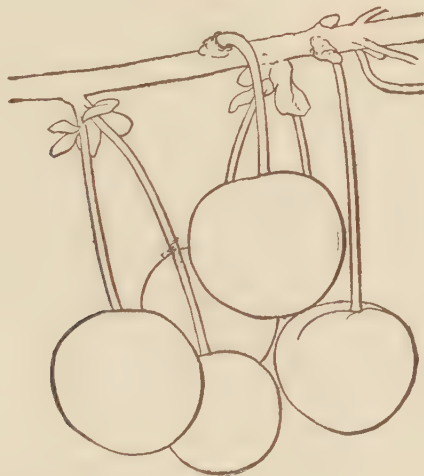


FIG. 516.—English Morello Cherry.

Morello.* (Wragg.) (English Morello, Large Morello, Dutch Morello, Ronald's Large Morello.) Rather large, approaching medium; round, obscurely heart-shaped; dark red, becoming nearly black; flesh dark purplish crimson, of a rich acid, mixed with a slight astringency. Season very late, or after mid-summer. In England its ripening is retarded till autumn by the shading of a wall. The common Morello is a smaller sub-variety, a little darker and with smaller branches. English. Fig. 516.

Olivet.* Large, roundish, deep red; flesh rich, vinous, good; season early. A favorite market variety in some parts of the East, but its greatest value is for canning. French.

Ostheim. Large, roundish, dark red; flesh liver color, tender, juicy, sub-acid, when fully ripe nearly sweet; good. Very hardy, slender growth. Russian. Mid-season.

Royal Duke. (Royal Tardive.) Very large, roundish distinctly oblate; surface dark red; flesh reddish, tender, juicy, rich; season rather early. Growth like the May Duke. France.

Shannon. Medium, round, flattened at base; dark purplish red; stalk long, slender, open; flesh reddish purple, rather acid. Middle of July. Cleveland, O.

Section II. Fruit bright red or lighter.

Belle de Choisy.* Size medium, round, very even, obscurely oblate; skin thin, translucent, showing the netted texture of the flesh; stalk rather short, slender; flesh pale amber, mottled with yellowish red, becoming in the sun a fine carnelian red; skin very tender, with a fine, mild, sub-acid flavor, becoming nearly sweet. Season rather early. Moderately productive; needs good cultivation. French. Fig. 517.

FIG. 517.—Belle de Choisy.



FIG. 518.—Belle Magnifique.

Belle Magnifique.* Quite large, roundish, inclining to heart-shaped; color a fine rich red, portions of the surface often a lighter hue; stalk slender, nearly two inches long, cavity large; flavor rather mild for this class, fine, but not of the highest quality. One of the best late varieties, ripening about midsummer. Productive. Fig. 518. Growth resembles that of the May duke in form. French.

Belle de Sceaux. Size nearly medium, roundish; red; stalk moderate; flesh rather acid—the tree and fruit somewhat resembling Early Richmond, but later.

Carnation. Large, round, yellowish white, mottled and marbled with fine orange red; stalk an inch and a fourth long, stout; flesh slightly firmer than most of this class, a little bitter at first, becoming mild acid, and with a rich, fine flavor. Growth spreading, leaves resembling those of a heart cherry. Mid-season. Europe.

Prince's Duke is a large sub-variety, but a very poor bearer and of little value.

Coe's Late Carnation. Rather large, medium; color amber and bright red; sub-acid, sprightly. Last half of July.

Duchesse de Palluau. Size medium, roundish heart-shaped; dark purple; stalk long, slender; cavity large, flesh dark red, mild, acid. Middle of June.

Early May. (Cerise Indulle.) Small, round, approaching oblate, bright high red; stalk an inch long; flesh juicy, acid, good. Very early. Tree dwarfish. Of little value.

Early Richmond.* (Virginian May, Kentish, Kentish Red, English Pie Cherry.) Rather small, becoming medium when well ripened, round, slightly oblate, growing in pairs; color a full red; stalk an inch or an inch and a fourth long, rather stout; flesh very juicy, acid, moderately rich. Stone adhering strongly to the stalk, often withdrawing it from the fruit when picked. Very productive; fine for early cooking; ripens early and hangs long on the tree. Valued everywhere. Europe.



FIG. 519.—Rocky Mountain Cherry.

Jeffrey Duke. (Jeffrey's Royal, Royale.) Size medium, round, obscurely oblate; color a fine lively red; stalk medium; flesh amber with a tinge of red, rich, juicy, of fine flavor. Growth slow, very compact, fruit in thick clusters. Season medium. Resembles Mayduke, but smaller, rounder, and lighter colored. Rare in this country.

Large Morello. (Kirtland's Large Morello.) Rather large, roundish; dark red, with a good, rich, sub-acid flavor. Early, July. Cleveland, O.

Pie Cherry. (American.) (Late Kentish of Downing, Common Red, American Kentish.) Size medium, approaching small, roundish, slightly oblate; stalk an inch to an inch and a half long, stout; color light red; flesh very juicy, quite acid, moderately rich. Rather late. Stone not adhering to the stalk, as with the preceding. Very productive; a good culinary sort.

Plumstone Morello. Large, roundish heart-shaped; color deep red; stalk an inch and a half long, slender, straight; cavity mod-

erate; flesh reddish, of a rich acid flavor. Very late, or after mid-summer. Stone rather long and pointed.

Reine Hortense.* Quite large, roundish oblong; bright red, slightly marbled and mottled; suture a mere line; sub-acid, rich, excellent. Last half of July. Tree a handsome, good grower, a moderate bearer. French.

Vail's August Duke. Large, obtuse heart-shaped; bright red; stalk medium; sub-acid, with a Mayduke flavor. First of August. Vigorous and productive. Troy, N. Y.

CLASS III. NATIVE DWARF CHERRIES.

The four varieties described below are as yet the only ones which have been at all cultivated or experimented upon. They are of



FIG. 520.—Sand Cherry.

little value for commercial purposes, or for home use, but are worthy of planting on barren soils and for ornamental purposes. It is quite within the range of possibility that valuable seedlings or hybrids may spring from them under intelligent cultivation.

Compass. Fruit about one inch in diameter, round, bright red, of good quality. A very rapid grower, and bears heavily every year. Originated with H. Kundson, Springfield, Minn., by pollinating Sand Cherry with Miner Plum. Thought to be of value on the plains.

Rocky Mountain. (Improved Dwarf.) Small, roundish, jet black, not very sweet. Tree small, bushy, not over four feet high, very hardy; bears profusely. Worthy of cultivation as an ornamental shrub. Colorado. Fig. 519. The species is *Prunus Bessayi*.

Sand Cherry. Small, roundish oval, black, variable in quality, usually very acid; ripens about August 1st. A very hardy shrub; branches irregular, coarse, and scrawny; bears profusely,

grows on the poorest soils. Fig. 520. The species is *Prunus pumila*.

Utah. Hybrid. Small, round, dark-reddish black, with a plum-like bloom; flesh soft, juicy, skin bitter. A bush three or four feet high. Hybrid of *Prunus Besseyi* and *P. Watsoni*.

CHAPTER XXII.

THE CRANBERRY.

THE American Cranberry (*Vaccinium macrocarpon*) is much larger than the European (*V. oxycoccus*), and superior in flavor. While growing it is light green, changing to a light or dark red, crimson, or mottled color, as it ripens. It blossoms in

June, and the fruit ripens in September and October. The running stems are often several feet in length, the small oblong leaves remaining during winter, on the approach of which they become brown. There are three types recognized. The Bell type (Fig. 521) is so called from its peculiar form; the Bugle (Fig. 522) somewhat resembles a bugle head; and the Cherry (Fig. 523) is nearly round.



FIG. 521.—Bell Cranberry.

While the differences in the external appearance of

cranberries offered for sale are manifest to the most casual inspection, there seem to be few generally recognized named varieties. In parts of the country where its cultivation is extensively carried on, as Cape Cod, local names have been given to choice kinds, but they are not as yet catalogued by dealers in nursery stock.

The cranberry is successfully cultivated in this country between 38° and 45° north latitude; but its limit may extend farther southward in the mountain ranges.

SOIL.

The best soil and situation consist of peat and muck bottoms, coated with pure sand obtained from adjacent banks, and the ground thus prepared must be capable of being flooded with clear running water at pleasure during winter, and thoroughly drained at other times, for it is absolutely essential that it should be dry during the blooming and growing season. Drift soils have proved unsuccessful. Muddy water running over the plants injures them.

In preparing the soil all wood and rubbish must be cleared off, called "turfing," and the surface, or "turf," removed with a hoe made for the purpose. It is then provided with drains by clearing out the main water-course and making parallel open side ditches at regular distances of about two to five rods. The whole surface is then covered with from four to six inches of pure sand. The chief object of this coating of sand is to retard the growth of the vines and thus increase their productiveness. An embankment or small dyke should surround the whole to allow the plantation to be flooded or drained at pleasure.

Setting the plants. After sanding, the plants are set in rows about two feet apart. Some prefer a greater distance, to admit more freely the passage of a horse cultivator. They should be ten or twelve inches in the row.

Flooding should be continued at intervals from December to May, and furnishes, among other advantages, protection from insects as well as from early frosts.

The plantation should be carefully kept clear of weeds for the first two or three years, after which, if well managed, the cranberry plants will cover the surface and render this labor comparatively light.



FIG. 522.—Bugle Cranberry.

Gathering the fruit is begun in September, and lasts several weeks. It is an arduous labor; various devices have been invented to facilitate it, such as the Lambert picker, used on Cape Cod. Raking with an ordinary steel garden-rake is sometimes



FIG. 523.—Cherry Cranberry.

practised, but tears the vines badly. Good pickers will gather from six to ten bushels a day.

VARIETIES.

A. D. Makepeace, said to be one of the most experienced cranberry growers in the country, and the owner of the largest cultivated bog in the world, states that there are now many distinct and named sorts, all originating from the types figured. Nurserymen, however, cannot be depended upon for supplying varieties true to name, which can only be had from reputable cultivators of cranberry bogs.

Dennis. Large, bright scarlet, prolific. Belongs to the Bugle type.

Early Black. Large, rich purple-black; good bearer; leaves turn purple in fall. A Bell berry. Ripens three weeks earlier than other sorts.

Early Red. Medium, bright red. A Bell berry.

Franklin. A new Bell sort.

Gould. Medium, bright purple, bell-shaped berry; light-colored foliage. Productive. Mid-season.

Lewis. Medium, bright glossy scarlet, bell-shaped. A beautiful berry. Mid-season.

McFarlin. Very large, dark red, oval berry. Late.

Makepeace. Very large, bright rose-purple. Belongs to the Cherry type. Early.

Neville. Medium, oval, deep crimson; flesh firm, skin decidedly

astringent, which becomes prominent after cooking. More desirable for jelly than for sauce.

Shaw. Medium, broad ovate, purplish red; flesh deeply colored, moderately acid; good. Very hardy.

Bell. Medium, pear-shape, bright red, occasionally mottled with lighter red; flesh firm, stained with red; rich acid, without astringency.

Cherry. Very large, roundish-oblate, yellowish white, mostly covered with patches of light red. Flesh firm; very good. A late keeper.

CHAPTER XXIII

THE CURRANT.

THE currant, from its hardiness, free growth, easy culture, great and uniform productiveness, pleasant flavor, and early ripening, is one of the most valuable of our summer fruits.

It is propagated, like the gooseberry, from cuttings, for which vigorous shoots of the last year's production should be chosen. As soon as the leaves ripen, cut off the new growth and make cuttings about six inches long. Set them in rows fifteen inches apart and two inches in the rows. Just as winter sets in, cover them over with coarse litter—taking it off in spring, and keeping them well hoed, and by fall they will have large fine roots. Half the buds only at the top of the shoot should be left; and the plants may be kept trained up to a single stem, a few inches high, when the branches should radiate on all sides in an upward direction so as to form a handsome spreading top. Currant bushes, if permitted to sucker moderately, will, however, endure for a longer time, as the new shoots, sending out roots of their own, afford, in fact, a spontaneous renewal. But care is needed that they do not form too dense a growth.

The currant being one of the hardiest and most certain fruit-producing bushes is, for this reason, badly neglected. Good cultivation and pruning will more than triple the size of the fruit. Old bushes should have the old and stunted wood cut out, and thrifty shoots left at regular distances. Old manure should be spaded in about the roots, and the soil kept clean, cultivated, and mellow. As the currant starts and expands its leaves very early, this work should be performed as soon as the frost leaves the soil. A resident in Canada says that the best currants he ever had, produced in great abundance, were obtained in a dry season, by covering the whole surface of the ground with cow manure as a mulch, three inches thick.

On looking under, the soil was always moist. Heavy pruning must follow the luxuriant growth thus produced. Currants thrive also when they are somewhat shaded, and consequently an excellent position for them is in the rows of young orchard trees. Clean cultivation cannot be too strongly insisted upon.

The different varieties of the currant succeed nearly alike in the Northern, Middle, and some Western, but fail in the Southern States.

PRUNING THE CURRANT.—In the culture of the currant three distinct modes are adopted. The first, which is quite common in this country, is to plant the bushes along garden fences, where they often grow up with grass, and being neither cultivated nor cared for, the fruit becomes small and of little value. This is the worst mode.

The next is to cultivate, but not to prune. The fruit on such bushes is fine while they are young, but as they become filled with a profusion of old bearing wood it diminishes in size.

The third and best mode is to give them good, clean cultivation, and to keep up a constant supply of young bearing wood, yielding large and excellent crops.

The currant, like the cherry, bears its fruit on shoots two or more years old; and it is important that a succession of strong young shoots be maintained for this purpose. When a cane has borne two or three crops, the fruit usually begins to deteriorate in size; therefore cut it out. In the mean time, a young cane should be coming on to take its place. After a bush has been in bearing three or four years, one or two of the old canes should be cut out each year. A good bush may



FIG. 524.—Raceme of Currants.

be allowed to have four to eight bearing canes at any time. The fewer the canes, the larger the fruit.

When a young currant bush is set out, all the buds or suckers below the surface of the ground should be previously cut



FIG. 525.—Cherry Currants.



FIG. 526.—North Star.

off clean, so as to form a clear stem. It is often recommended that this stem be a foot high before branching—which does well for the moist climate of England; but under our hot suns it is better that the branches begin near the surface of the ground.

CLASS I. *Red and White Currants.*

Attractor. Large, very white, handsome, strong grower and productive. French.

Cherry.* Very large, nearly twice the size of the common Red Dutch, often five-eighths of an inch in diameter; round, dark red; clusters moderately short, quite acid. Growth tall and luxuriant. The shoots sometimes go blind; that is, the buds near the end are often imperfect or wanting. A standard variety. The flavor is improved by hanging long. Fig. 525. Italy.



FIG. 527.—Palluan.



FIG. 528.—Red Cross.

Fay.* (Fay's Prolific.) Bush vigorous, spreading, generally more productive than Cherry; bunch long, well filled, with a long stem which facilitates gathering; berries variable in size, averaging large; dark red, mild, good, mid-season. Generally considered better than Cherry, but reports on it are very conflicting. Largely grown for market. New York.

Gondoin Red. (Raby Castle, May's Victoria, Rouge d'Holland.) Large, bright red, bunch long; bush shoots strong, vigorous. The leaves and fruit hang long. It proves of good quality by

the first of September. Much earlier, it is sour and unpalatable. France.

Gondoin White. Fruit large, whitish-yellow, less acid than most other sorts, of excellent quality. A strong grower and productive.

Holland. (Long Bunch.) Bunch long, well filled; berries medium to small, bright red; quality good. Season medium. Bush unusually vigorous and holds foliage well. Popular in many parts of the West. Europe.



FIG. 529.—Red Dutch. FIG. 530.—White Dutch. FIG. 531.—White Grape.

Knight Large Red. Size of berries moderate, or nearly as large as Red Dutch—bright red. This is not a sweet currant, and is rather more acid than White Dutch.

Knight Sweet Red. (Goliath, Fielder's Red, Palmer's Late Red, Pitmaston Red, Pitmaston Prolific, Large Sweet Red, Bertin No. 1, Danen's Selected.) Berries medium, bright red; bush strong and vigorous; shoots mostly erect.

London Market. Bunch medium, long; berries large, light crimson, resembling Fay. Sharp acid, good; seeds large and numerous. Mid-season. England.

North Star. Medium size berry on long stem, bright crimson, mild and rich. Very hardy. Bears early and profusely. Season late. Vigorous. More valuable for home use than for market. Minnesota. Fig. 526.

Palluau. (Fertile Currant of Paluau.) Large, dark red. Productive, nearly the size of the Cherry Currant. French. Fig. 527. Resembles Red Dutch.

Prince Albert.* Bunch short, berries medium to large, light red, ripens quite late. Growth strong, productive. Popular for canning.

Red Cross. Large, red berry, long cluster, and stem long between fruit and stem; flavor mild, sub-acid, excellent. Mid-season. Growth vigorous, productive. A valuable variety. Fig. 528. New York.

Red Dutch.* (Fertile, Fertile d'Angleterre, Fertile de Bertin, La Hative, Hative de Bertin, Bertin No. 9, Belle de St. Gilles, Chenonceaux, Grosse Rouge de Boulogne, Queen Victoria, Red Grape.) Bush generally dwarf, somewhat slender habit. Prolific bearer, ripens at mid-season. A little larger than the common old red currant, and clusters much longer and a little less acid. One of the oldest varieties in cultivation and still a prime favorite. Europe. Fig. 529.

Transparent. Large, yellowish white, very productive. Said to be a seedling of White Grape, and resembles that variety.

Versaillaise.* (La Versaillaise, Red Cherry.) Large, closely resembles Cherry, but slightly less acid; deep red, bunches long but regularly filled, bush rank grown; the young shoots break off very easily. Productive, valuable. A seedling of Cherry, and often confounded with that variety. One of the best market varieties. French. La Fertile and La Hative scarcely differ from Versaillaise.

Victoria.* Bush a strong grower, upright, productive; cluster medium; berries large, bright red, mild acid, good. Mid-season to late. Partially exempt from the attacks of the twig borer, hence a leading variety in some places. Distinct from Red Dutch. England.

White Dutch.* Full medium in size, yellowish white, bunches rather long; less acid than Red Dutch and other red currants, quality best. Dana's White is nearly identical. Fig. 530.

White Grape.* Large (rather larger than White Dutch); bunches rather short, quality excellent. Growth spreading and moderately vigorous. Fig. 498. Europe.

Wilder.* Bush a vigorous, upright grower; berries very large, fine color, lighter than Fay, remaining fresh on the bushes longer; flavor mild, good. A seedling of Versaillaise which promises to become a standard. Indiana.

CLASS II. *Black Currants.*

Black Naples. Large (sometimes five-eighths of an inch in diameter), black; bunches small, with a strong musky flavor. A coarse grower. Fig. 532. One of the best-known English sorts.

Champion.* Large berries, black; flavor mild and good, prolific, superior to Black Naples. Mid-season. Good for cooking; jams, etc. Best. Fig. 533.

Common Black or Black English. Large, one-third of an inch in diameter, quite black, clusters very short, with a strong odor; mid-season; flavor poor.



FIG. 532.—Black Naples.



FIG. 533.—Champion.

Crandall. Large, blue-black, mild, sub-acid, spicy. Bush vigorous and prolific. Season late. The thick tough skin makes it objectionable for most culinary purposes. A variety of the native *Ribes aureum*. Kansas.

Lee's Prolific.* Bush dwarf, upright, moderately vigorous, productive; berries large, of good quality. Mid-season. Considered to be an improvement on Naples, especially in size.

Prince of Wales.* Bush vigorous and productive; fruit variable in size, averaging large, of milder flavor than most other black varieties. Nearly sweet when fully ripe. Mid-season. Good. Ontario.

CHAPTER XXIV.

THE GOOSEBERRY.

WITH the advent of the practice of applying fungicides new possibilities are opened up for success in propagating and obtaining satisfactory and profitable crops of the superb varieties of these fruits, so much esteemed abroad. The field is an inviting and a promising one, and offers opportunities to the painstaking cultivator which will no doubt prove encouraging and remunerative. Few even of our native varieties of gooseberries are wholly free from mildew, and no one who plants them should neglect spraying.

The propagation, pruning, and cultivation of the gooseberry are similar to that of the currant (see p. 386).

Of the English gooseberries many hundreds have been named and described, and large numbers have been imported and tried in this country, but they have so generally mildewed and become worthless after bearing a year or two that they have been mostly discarded. A few of the best are included in the list below and in the Index of Fruits.

I. EUROPEAN VARIETIES.

Chautauqua.* Bush vigorous, sometimes mildewing; fruit large, roundish oblong, smooth, pale green, of the very best quality. Unexcelled for home use. New York.

Columbus.* Large, oval, greenish-yellow, smooth, very good. Hardy, vigorous, productive, free from mildew. Fig. 534. A valuable mid-season sort. American seedling.



FIG. 534.—Columbus.

Crown Bob. (Melling's Crown Bob.) Large, often an inch and a fourth long, roundish oval, red, hairy; flavor of first quality; early; branches spreading or drooping. England. Fig. 535.

Industry.* Very large, oval, dark red, hairy. Vigorous upright

growth, prolific. Season early. One of the best known and most successful varieties. Quality good. Fig. 536.



FIG. 535 - Crown Bob

Lancashire Lad. Large, bright red, smooth, excellent quality. Vigorous and productive. A favorite English berry. Fig. 537.



FIG. 536.—Industry.

FIG. 537.—Lancashire Lad.

Red Warrington. Rather large, roundish oblong, hairy; flavor of first quality. Hangs long without cracking and improves in flavor. Branches drooping.

Triumph.* A strong grower, comparatively free from mildew. Fruit large, oblong or roundish, pale yellow, smooth, sweet, very

good. One of the best varieties of recent introduction. American seedling. Columbus seems to be the same.

Wellington's Glory.* Large, oval, very downy; skin quite thin; flavor excellent; branches erect. Comparatively free from mildew and one of the most productive of English varieties. England.



FIG 538.—Whitesmith.

Whitesmith. (Woodward's Whitesmith.) Rather large, a little over an inch long, roundish oval, slightly approaching oblong; yellowish white, very slightly downy; flavor of first quality; branches rather erect. Fig. 538. England.

II. AMERICAN VARIETIES.

Champion.* Bush vigorous, very free from mildew; berries medium, round ovate, smooth, greenish-white, with a thin, almost transparent skin; quality good. Early. Valuable. Oregon.

Downing.* (Downing's Seedling.) Medium or rather large, oval, pale green, quality good; bush upright, productive. Mid-season. Larger than Houghton. Bush of strong, heavy growth, very spiny. New York. Fig. 539. More widely grown than any other variety.

Houghton's Seedling.* Fruit small, oval, commonly about three-fourths of an inch long; skin smooth, thin, glossy, a pale dull reddish brown, marked with faint greenish lines; flesh tender, juicy, sweet, pleasant. Ripens soon after mid-summer. Not high flavored as compared with the best European sorts, but a profuse bearer, free of mildew, and of very easy cultivation. A seedling from a wild American species. Fig. 541. Origin, Lynn, Mass.

Mountain. This sort resembles the Houghton in color, but is mostly larger in size, has a thicker skin, and is slightly inferior in quality. Bush strong and upright. Probably a hybrid between *R. cynosbati* and a variety of *R. grossularia*.



FIG. 539.—Downing.



FIG. 540.—Golden Prolific.

Pale Red.* Rather small, or size of Houghton, but darker in color when fully ripe. Sweet, quality very good. Mid-season. Bush a strong grower, very productive. One of the oldest cultivated varieties of the native species.



FIG. 541.—Houghton.

Pearl.* A cross between Downing and Ashton's Seedling, an English variety. Resembles Downing so closely that the two

can hardly be distinguished. In some places it is superior to its parent. Ontario.

Red Jacket.* Medium, oval, red, smooth, flavor good. Season early. Prolific, vigorous grower, free from mildew. Ontario.



FIG. 542.—Smith.

Smith.* Larger than Houghton, light or yellowish green, excellent in quality. Early. Bush of moderate growth. Vermont. Fig. 542.

CHAPTER XXV.

THE GRAPE.

THE production of new varieties of grapes by means of cross-fertilized and selected seeds is so easy that the number thus annually introduced is hardly, if at all, inferior to the new varieties of strawberries. While occasionally the merits of a new grape, either in the high quality of the berry, its ability to bear transportation, and its handsome appearance, or the hardiness of the vine and its freedom from disease, command for it a permanent place in our list of standards, still the great majority have but a fleeting existence, and seem to serve only to keep the Experiment Stations busy and to confuse and annoy the nurserymen. It is manifestly impossible, even if it were advisable, to include in the following list of varieties anything like a complete catalogue of all the experimental fruits which have been produced and more or less fully described and praised. It is believed, nevertheless, that all which have established a place in this country will be found enumerated.

It must be borne in mind that with grapes, even more than some other fruits, the location in which they are grown has a great influence, favorably or otherwise, upon all the characteristics both of vine and berry. Varieties which are of superlative merit in some places are almost valueless in others, and *vice versa*. The safe rule in selecting and planting is to consult the State Experiment Station and growers.

In the recent past one aim of propagators was to grow varieties which by consecutive ripening would prolong the season. Since the general adoption of the cold-storage systems, however, the question is now, which grapes of high quality are the best keepers. Good, plump, handsome-looking fruit thus kept over is to be purchased up to the first of April, and the

possibilities are in favor of a still longer extension of their season.

That period is now exceeded, among all our kinds of fruit, only by the apple and pear. The apple now fills the whole yearly circle—"it belts the year." The pear continues to ripen from midsummer until the following spring, although there are few sorts that keep well after January; grapes may be kept in cold storage almost as easily as winter apples. The peach in the North continues to ripen scarcely two months at furthest—the plum about the same—while neither will keep long in a fresh state. The hardy grape will yet give us a delicious fruit remarkable for its wholesomeness, in unlimited quantity if we desire it, scarcely if ever failing with seasons—not less than eight out of the twelve months of the year.

PROPAGATION OF THE GRAPE.

The vine is propagated by *seeds, layers, cuttings, and by grafting.*

Seeds are planted only for obtaining new varieties, as described in an early chapter of this work.

The facility with which the grape emits roots on its young stems, and the rapidity of its growth, render it one of the most easily propagated of all bearers of fruit. The new shoots, buried before mid-summer, with a few inches of permanently moist earth, do not fail to throw out plenty of young fibres from every buried joint the first season. Cuttings and single buds under favorable circumstances will root with equal certainty.

LAYERS—*Summer Layering.*—Layering is the easiest and most certain, but not the most rapid mode of propagating the grape. It may be done on a small scale, for amateur purposes, without any special preparation, by using accidental or straggling shoots, or those purposely left near the foot of the vine. Usually a little before mid-summer these shoots will have hardened sufficiently to prevent the rotting which might occur if buried too soft or green. Extend the shoot on the ground in order to determine the most convenient spot for excavating under the centre. Then make a small hole or

depression with the spade, bend a shoot into this hole and cover it with a few inches of earth, as shown in the following figure (Fig. 543). The surface of the ground must then be kept clean and mellow for the purpose of preserving moisture in the soil; and should the season be a very dry one, the surface should be mulched—that is, covered with a few inches of fine grass or short straw. If the shoot is a strong and thrifty one, and grows well at its extremity out of ground, every joint will emit a profusion of roots, before the end of autumn presenting the appearance shown in Fig. 543. The layer may then be taken up by cutting it close from the vine and shortening-back its extremity, and then, by setting a spade far



FIG. 543.—Grape Layer, the roots formed.



FIG. 544.—Grape Layer, separated into two plants.

under it, lifting the whole out of the ground. It is then cut in two and forms two strong plants as shown in Fig. 544. These layers may be then heeled-in or covered with earth for the winter, giving some protection from freezing by covering the surface with manure or leaves, or they may be packed for the winter in boxes of damp moss in the cellar.

Spring Layering.—As layers, like unmolested runners on the strawberry, exhaust the main plant, they should be taken very sparingly from bearing vines. When they are required in large numbers, vines should be planted specially for this purpose—the soil to be made very rich and well cultivated, so as to produce a strong growth of shoots—unlike the moderate fertility required for bearing crops. The spaces between these vines should be six or seven feet; and generally two or three years are required, in connection with cutting-back to two or three buds, and training one or two shoots to upright stakes, before the canes become strong enough to layer profitably. When this is the case, begin the work late in spring, about the time the buds open, by laying down the strongest

cane of the two into a smooth, straight trench made for the purpose, about five inches deep. The cane selected should not be less than eight or ten feet long, but so much of the end should be cut off as to leave only strong buds, the remaining part not being more than six or seven feet long. With short-jointed varieties it should be less in length. It is held in this position by pegs or stones. The object being to obtain a strong shoot at each eye, the end should not be bent up, which would draw the growth off in that direction. As soon as the new shoots have grown a few inches, the prostrate vines should be slightly covered with earth, which is to be increased as the growth advances. A more perfect way is to



FIG. 545.—Shoots springing from a layered stem.

sprinkle a little compost along the cane and then fill the trench a few inches with loose damp moss. This will preserve a proper humidity and afford sufficient light to the starting shoots. After they have become well hardened the moss is removed and mellow soil substituted. The earth, if applied too early, might induce rotting in the young stems. Fig. 545 represents the appearance of this process after the shoots have attained full growth and rooted well at the bottom. Usually about half a dozen plants are a sufficient number to raise from one cane; more will start, but they should be rubbed off to give strength to the remainder. When a part outgrow the others, they should be pinched back to equalize the growth. This process is repeated for successive years; but as it tends to exhaust the main plant it is advisable to suspend it occasionally for a year if the vigor becomes diminished.

These new plants are well rooted before winter; and should be taken up, separated, and packed away as already described. Fig. 546 represents one of these new plants.

It will be observed that while these plants were forming from the layered cane, one, two, or three shoots, according to the strength of the plant, should be trained to a stake for next

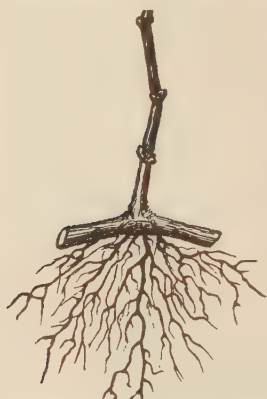


FIG. 546.—Newly formed layer plant.

season's work, the cane having been properly cut back for this purpose.

CUTTINGS IN OPEN GROUND.—

This is the common method of raising commercial grape-vines at the present time. Much depends on the character of the soil for retaining moisture, and still more on the humidity of the air, which varies in different localities and with seasons. A rich, moderately compact, deep, and mellow soil is required. It is especially important that it possess fertility in order to give the young plants a strong impetus the moment

new roots are emitted. Shoots of one season's growth are selected, of full medium size, omitting small or unripe portions. Where the winters are severe, this wood should be cut off late in autumn, shortened to convenient lengths, and packed in slightly moist earth, or, what is better, in damp moss, in boxes placed in a cellar. Sometimes the cuttings are placed in a bed in autumn, which answers well in mild climates, or where they are well protected during winter, with a thick layer of straw, manure, or leaves.



FIG. 547.
Grape
Cutting.

The cuttings are usually made about seven or eight inches long, and each one should have two or more buds. It should be severed by a sharp knife immediately

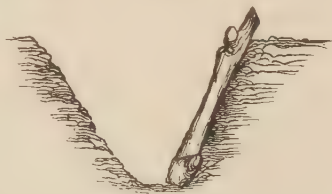


FIG. 548.—Mode of Planting Cuttings.

below the lower bud and about an inch above the upper one, as shown in Fig. 547. A trench (Fig. 548) is made with a

spade next to a line, nearly perpendicular on one side and sloping on the other. The cuttings are placed upright against the steep side, about three inches apart, so that the upper bud shall be about an inch below the level surface. Fill the trench to the upper bud by adding successive portions, dressing each firmly with the foot, but leaving the soil more loose and mellow above. After the shoots have grown a few inches the surface may be levelled by burying the upper bud an inch beneath it. Some cultivators are more successful by covering the surface with an inch or two of fine manure for the retention of moisture in the soil. Roots will be emitted from both buds, and handsomer plants will be formed by cutting off the lower part, leaving the roots of the upper bud only to remain.

PROPAGATION FROM SINGLE BUDS.—The various modes of propagating the vine from single buds admit the rapid multiplying of numbers required for work on a large scale; but artificial heat is always necessary, either on a small scale in hot-beds, or more extensively in propagating-houses.

Good, strong, well-ripened wood of one year's growth must be cut in autumn, and secured for winter as already described. The work of forming or planting the buds or eyes is usually done in March; and being inserted through the month by successive portions, the work of repotting and afterward setting out into open ground, may be also performed successively without crowding all the work into one period. It should not be done much later than early in April, when warm weather without may prevent the operator from giving the low temperature to the house required for the leaves and shoots during the early stages of growth.

The operation should be commenced by trimming the wood which holds the eyes into proper form—throwing them into water to prevent drying, until enough are prepared for setting in the beds or pots. Different modes or forms are adopted for these cuttings. One of the best for general practice is represented in Fig. 549, the cut being about two and a half inches long, with the bud at the upper end about a fourth of an inch from the top.

When hot-beds are employed in giving bottom heat, the cuttings are usually placed in pots; but in the more common

practice of employing propagating-houses, they may be placed either in pots, shallow boxes, which have been well soaked in lime-wash some months before to prevent the formation of mould or fungus, or directly in beds about three inches deep over the hot-water tanks in the house. The best material for receiving the buds is clean, pure building or lake sand, which is to be kept at all times at a uniform degree of moisture, but *never wet*. It is the practice with some to place a stratum of

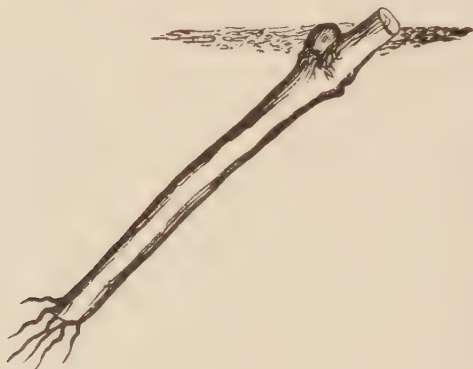


FIG. 549.

prepared soil (hereafter described) an inch beneath the wood for the reception of the new roots, and sustaining the young plants for a longer time than sand alone—thus obviating so early a removal into pots as would otherwise be required. Each bud or eye need not occupy more than two square inches of surface. When properly imbedded in the sand, a moderate heat should be at first applied, not higher than fifty degrees—the object being to commence roots before sufficient warmth is given to expand the leaves. For this purpose also, the temperature of the air in the house should be kept at all times at least ten degrees lower than that of the sand. In a few days from the commencement, the heat may be gradually raised, and as the leaves expand, it may be cautiously increased to eighty and ninety degrees. It is of great importance to avoid the checks given by sudden changes, from cold currents of air, cold water, or remitting fire.

When the roots have reached three or four inches in length

the plants should be potted off into a soil prepared for this purpose, by mixing about equal parts of clean sand and rich, rotten turf, or leaf mould in the place of turf. This mixture should be prepared several months beforehand, and be thoroughly pulverized and the parts mixed together; and unless the turf is quite rich, the addition of about one-fourth of rotten manure would be advisable. About a thirtieth part of wood ashes improves the mixture. Plenty of water should be given until the plants become established in their new home. When the roots reach the exterior of these pots they may be either transferred to larger ones or to the open ground—which completes the process for the first season.

GREEN CUTTINGS.—Propagating by cuttings of unripe wood is practised, when it is desired to increase new sorts rapidly, in connection with common propagation by single eyes. As they do not always mature well, or make strong vines the same season, they are objected to by many propagators. Occasionally, however, good strong vines may be obtained. They are made by taking strong shoots in summer, and making them into cuttings with one eye at the top, leaving on the leaf. These are inserted into sand (or the same kind of soil used for single eyes), as far down as the bud, the leaf resting on the surface. When small numbers are propagated, pots are used and moisture retained in the leaves by placing them under a glass frame in the propagating-house, where the proper degree of moisture is maintained without the excess which would cause rotting. On a larger scale the cuttings are placed in the borders of the propagating-house, the leaves forming one continuous green surface. These are kept constantly moist by watering them from the watering-pot, three or four times a day. In about three weeks they will be fit to remove to pots, and are then to be treated like other plants. They generally succeed best by being kept in the house during the remainder of the season, the wood ripening better and the vines becoming hardier, than if planted out in open ground, where there is not sufficient warmth to mature and harden the green wood.

ROOT GRAFTING.—This mode has also been somewhat adopted for propagating new varieties. It is done by taking a portion of the shoot with one bud, as shown in the annexed figure (Fig. 550), and inserting a piece of root cut wedge-form

into a cleft in the lower end of the cutting. Waxed strings bind the parts together, but they are left open below for the emission of roots. Varieties which furnish long, smooth roots are most convenient, of which the Concord is one of the best.



FIG. 550.
Root Graft

The grafts are placed in shallow boxes of a convenient size, or about one by two feet, and three inches deep, and bottom heat given as before described, but less care is required in controlling the temperature.

GRAFTING IN OPEN GROUND.—Large vines and vineyards of undesirable sorts are sometimes changed to better by grafting. It is uncertain if carelessly done, although the grafts, when they do not fail to grow, push with great vigor, and frequently extend twenty feet or more in a single season. There are three different modes: one is to graft early in spring down into the root; the second is to defer the work until the buds swell and bleeding ceases, preserving the grafts in a dormant state in a cool place. The third, and generally the most successful, is grafting in autumn, according to the mode described in Fuller's "Grape Culturist." A cleft graft is made at or near the surface of the earth, and the parts firmly bound together. An inverted pot is then placed over it and banked with earth, except the top, which is covered with six inches of straw, and the whole then buried in earth. This is removed in spring. Grafting in the open air appears to be so easily influenced by so many external causes, as frequently to result in entire failure, even in the most skilful hands.

TRAINING.

Young plants should be trained to a single strong shoot, like that represented in Fig. 551, for which purpose a stake should be used and the vine tied up as it advances. Spring plants set out early will often reach a height of six or eight feet by the end of the season.

Cuttings of the first year's growth, as well as layers, are sometimes fitted for finally transplanting to the vineyard

by one season's cultivation in nursery rows. During this time they should all be trained to a single shoot, kept upright by staking; the young plants being cut down to two or three eyes when set out, and the strongest only being allowed to grow, rubbing off the others as soon as the young shoots are fairly developed. Pinching off the tips occasionally, after they have reached four or five feet in height, will render the shoot and buds stronger, and the wood will ripen better.

TRANSPLANTING.—This is effected most perfectly by making a broad hole, and rounding up the central portion of the bottom. The stem being cut down to two or three strong buds, and very long roots clipped off, the plant is placed with the centre on the rounded surface of earth, and the roots then spread out in every direction, as shown in the following figure (Fig. 552). The hole is filled with finely pulverized earth, which completes the transplanting.



FIG. 551.—One-year Vine.

The following is the usual course for forming the plants into bearing vines—three years being required for this purpose, if strong plants are used and good cultivation given. One or two more years are, however, frequently required, if the growth is not sufficiently vigorous:

First Year.—The plant having been cut down to two or three eyes when set out, the strongest is trained to a single shoot, the others being rubbed off. The tip should be pinched off after growing several feet, to strengthen the cane.

Second Year.—Last year's shoot being cut down to two or three buds, or to a foot or more in height, the same course is

to be pursued; but two shoots, instead of one, are to be grown from the two upper buds.

Third Year.—If the vine is not very strong, cut down these shoots again, and train two new and stronger ones from them, or cut them back part way and raise shoots from the cut ends. If any fruit bunches are produced, remove them early in the



FIG. 552.

season. The best rule to determine whether to cut back again the third year is obtained from the size of the canes, which should not be less than half an inch in diameter. If fully of this size the trellis may be erected, and the training of the vines upon it commenced.

TRELLIS.—Different modes of constructing trellis have been

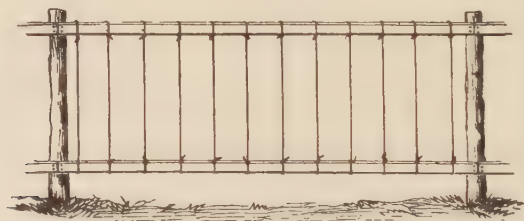


FIG. 553.—Trellis with Upright Wires.

adopted. It is not essential which is used, but the cheapest and most durable is to be preferred. Fig. 553 represents the mode recommended and adopted by Fuller. It is about four feet high, and is intended for a single series of horizontal arms with vertical bearing canes, now rarely adopted. If two series of arms are desired, the height may be increased to seven feet. It consists of durable posts placed ten or twelve feet apart, to which horizontal rails are nailed. the upper one

at the top and the lower one about a foot from the ground. Between these, vertical wires, about a foot apart, are stretched as shown in the figure. These wires being shorter than when stretched horizontally, need not be so large, and a saving is thus effected in the expense. Each bearing cane is trained to one of these wires.

Another mode is to use wires stretched horizontally, as shown in Fig. 554. The lowest should be eighteen inches or two feet from the ground; the next may be an equal height above, and to these the horizontal arms are tied, each twelve to sixteen inches higher. This is the prevailing method.

Cultivators differ as to the size of the wire suitable to be



FIG. 554.—Trellis with Horizontal Wires.

employed. Some use even as large as No. 8, which is one-sixth of an inch in diameter, and is thirteen feet to the pound. Others severally employ No. 10, which is twenty feet to the pound; No. 12, which is thirty-three feet, and No. 14, which is fifty-four feet to the pound. For the vertical wire trellis, already figured, No. 16 is large enough, which is nearly one hundred feet to the pound. When the smaller wire is used, it should pass through holes in the end post, and be brought around at the side, and the end twisted around the main part. This may be easily done by using a strong, round piece of wood about a yard long, around which the end is brought, and which by using as a roller and lever combined, easily accomplishes or renews the desired tension. No. 10 is most used.

The wire used for this purpose should be annealed, and is best when galvanized. The wires are fastened to the other posts by staples; or easier by two common nails, with heads touching, the lower one a ten-penny, and the upper a six-penny. Fig. 555.

Trellis made wholly of wood also answers a good purpose,

whether of horizontal bars nailed to posts, or vertical rods nailed to an upper and lower horizontal bar.

TRAINING ON THE TRELLIS.—Whatever mode of training is adopted, the following general rules should be observed:

1. Allow no shoots to grow nearer than about one foot of each other.
2. Cut back each bearing shoot at the close of the season to as many eyes or buds as will give the desired quantity of fruit the following year.





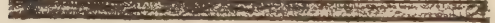
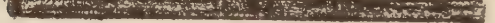



No. of Feet to One Pound.		Nos.
98		16
72		15
59		14
44		13
34		12
26		11
20		10
17		9
13		8

FIG. 555.—Sizes of Wire for Trellises.

3. Rub off, as soon as they appear, all shoots not wanted.

In the following pages are described some of the methods of training which are interesting and successful in the home garden.

After the two canes have been formed the third year on the young vine, as already described, they are to be cut off to within about four feet of the base, and spread out in opposite

directions horizontally, to form the arms. As buds always tend to break into shoots soonest where bent back from an upright position, and also from the extremities or tips of the canes, these arms, if brought out straight, as in Fig. 556, will



FIG. 556.

produce shoots irregularly, the buds on the middle portions of the arms not breaking at all, while the others may have grown several inches. To prevent this difficulty, bend them in curves, as shown in Fig. 557—the middle portions being



FIG. 557.

highest will strike shoots equally with the other parts. As soon as these shoots are well under way, the arms may be brought into a straight horizontal position. If trained to the vertical wire trellis, each shoot should have its appropriate



FIG. 558.—Bearing Vine.

wire, and all others be rubbed off. If the horizontal wire trellis is used, each shoot should be tied to the second wire, as soon as it has grown sufficiently to reach it. When the young shoots have reached a few inches above the top of the trellis, they should be kept pinched back to this height, for the rest of the season. Each one will probably set two or three

bunches of fruit, and if the canes are strong enough, these may be allowed to remain and ripen, and will present in autumn the appearance shown in Fig. 558, or as in Fig. 559 after the leaves have fallen.

If the vine is intended to be laid down and slightly covered for winter, the pruning may be done at any time after the fall of the leaf. Or if it is desired to use the wood that is cut away for propagating new vines, the pruning should be done before the shoots are severely frozen. As all pruning in autumn increases the liability to injury by the cold of winter, one or two extra buds



FIG. 559.

should be left on the stump, to be cut down the following spring. If the pruning is not done in autumn, it may be performed at any subsequent period before spring.*

MODE OF PRUNING.—When the young arms are first attached to the trellis, each bud, which is intended to form its upright



FIG. 560.



FIG. 561.

bearing shoots, will present the appearance shown in Fig. 560. After growing one season, as in Fig. 559, each shoot is to be cut down to a good bud, as in Fig. 563. This bud is to grow and form the bearing shoot for next year. The pruning should be done as closely as practicable to the horizontal arms, provided one good strong bud is left on the stump or spur. After the pruning is completed, the vines (already represented by Fig. 558) will exhibit the appearance in Fig. 562. The vine is now ready to throw up another set of bearing shoots for the coming year. It is the practice of some cultivators to leave

* *Bleeding*, or the rapid escape of the sap by spring pruning, causes much less injury than is generally supposed, and many cultivators who have made the experiment thoroughly have scarcely perceived any unfavorable result on hardy grapes.

two or even three buds on each spur, so as to form two or three bearing shoots from each, in order to obtain a fuller crop. This is, however, drawing too severely on the vine for continued practice. To maintain the vigor of the vineyard, as well as to obtain large, well-developed, well-ripened bunches and berries, the vines should never be over-cropped;

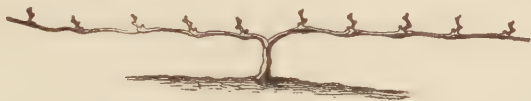


FIG. 562.—Pruned Vine.

and one shoot from each spur is, therefore, sufficient. The reports which are often made of six, seven, and eight tons of grapes from an acre, may be set down as evidences of bad management and over-exhaustion of the vines. Three to four tons per acre is the largest amount which good and continued success will warrant.

By raising bearing shoots from the same spur for successive



FIG. 563.



FIG. 564.—Laterals.

years, this spur will become lengthened several inches, or at the rate of about one inch annually. Although little inconveniences result, it is desirable to keep them short; and for this purpose the spur may be cut back to one of the smaller buds at its base, and a new shoot thus brought out to form the beginning of a renewed spur. As this new shoot springs from a small bud, it should not bear any fruit the same season, but its whole strength be given to the formation of wood to furnish next year's bearing shoot. By selecting each year a small

number for this renewal, the process may be going on annually with but little interference with the general crop. Fig. 563 shows the manner in which this result is effected, the dotted line marking the place where the old spur is cut out on the left, for the benefit of the new shoot on the right.

SUMMER PINCHING.—At every joint of each new shoot is a strong leaf. In the axil (or arm-pit) of each leaf-stalk, buds are formed, which if allowed to remain will grow into fruiting branches another year. Opposite to each strong leaf is a tendril; or in its place a bunch of fruit, if near the base of strong shoots—tendrils being regarded as abortive fruit-bunches, serving also the purpose of clinging to supports and sustaining the vine. These, it will be observed, are opposite the leaf-stalk and bud. From the axil of the leaf-stalk a new and feebler shoot often springs, which is called a lateral—two of which are shown in Fig. 564. Vigorous laterals will sometimes throw out others which are termed sub-laterals. Laterals should be allowed to remain, as displacing them tends to injure or destroy the buds.

To prevent shoots or canes from growing too long, and also for the purpose of increasing the strength of the cane and its buds, the practice of pinching off is adopted, and is generally performed after midsummer. This pinching, giving a check to the cane, tends to the emission of laterals, which should also in turn be pinched at their tips.

It is a common practice with most cultivators of hardy grapes to pinch off the shoots as soon as three leaves are formed above the upper bunch of fruit. A less number will be insufficient to furnish food for the forming berries; a greater number of leaves would doubtless be better, provided there is room on the trellis. A good rule in practice is to allow the bearing shoots, shown in Fig. 558, to pass a few inches above the top wire, before the tips are pinched off. After pinching, the upper bud will frequently "break," or start into a new shoot—in which case a second pinching should be given, and so on as long as the growing season continues.

Summer pruning consists, in addition to this pinching, in rubbing off all useless shoots when they first appear. Bearing canes should be at least ten inches or a foot apart, and all shoots between them are useless and detrimental, by crowding

the foliage, lessening its health and vigor, and drawing strength from the vine. The process of rubbing off is generally begun quite early in summer, or by the time the first shoots are but a few inches in length; and it should be continued or repeated as long as any intruding shoots spring from the vine. In commercial work, summer pinching is not employed. It entails too much subsequent thinning.

MODIFICATIONS OF TRAINING.

But one mode has been described, namely, that represented in Fig. 558. Some cultivators adopt a modification of this



FIG. 565.

plan, by employing a single horizontal arm, extended in one direction only (Fig. 565), instead of the two arms on opposite sides. This mode appears to succeed well, and is regarded

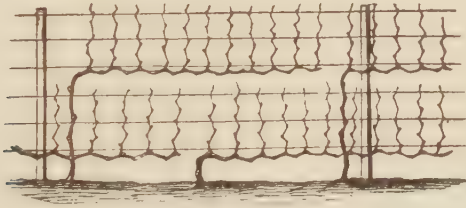


FIG. 566.—Thomery System.

as simpler than the other. Another mode is what is termed the Thomery system, and is represented in the foregoing figure (Fig. 566). Its object is to cover a higher trellis where the ground is limited, or to extend the vine over the walls of buildings. It obviates the difficulty of two or more horizontal arms, one above the other, on the same vine, by allowing but a single arm from each, as will be seen by inspecting the

figure (Fig. 566). Double the number of vines are planted along the trellis, and every alternate one carried up to the second tier. A greater number of vines may be planted, and the trellis raised to a corresponding degree.

SPRAYING GRAPES.

No grower will undertake now to raise grapes without thorough spraying. Anthracnose and mildew and black rot

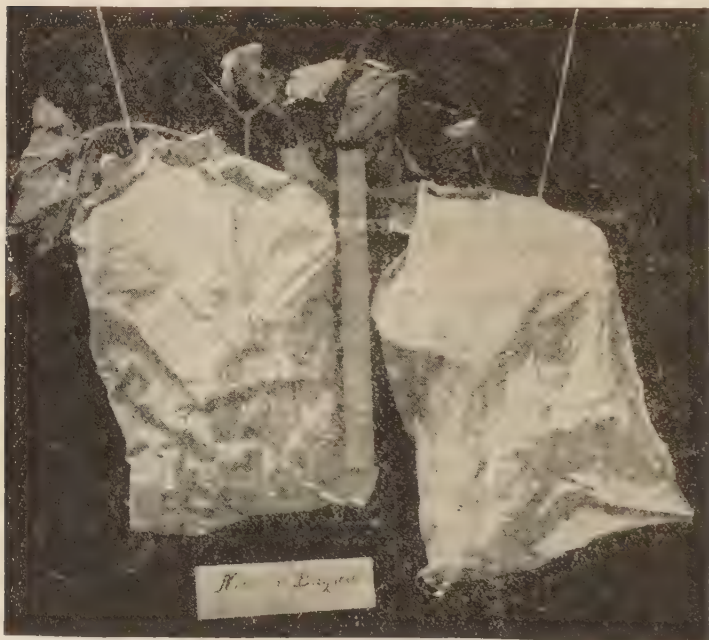


FIG. 567.—Bagged Grapes.

may not appear, but the chances are too great to risk when the prevention is so easy. For full directions see p. 242.

BAGGING GRAPES.

for a time was practised only by the amateur with a few vines, but the results attained are so manifest and so improve the

market value of the fruit that not a few commercial growers regularly bag their fruit bunches. While the cheapest and thinnest paper bags oftentimes are equally effectual, good stout ones of manilla may be purchased at a low figure. Those commonly used by growers, holding about two pounds, are right. Enclose the bunch as soon as the berries are well formed; do not wait for them to grow. Draw the top of the bag together, fold it over the stem of the vine, turn it over, and pin. It may be left thus until the grapes are fully ripe, when they will be found as large, as nicely colored, and much more perfect and handsome than those not so protected (Fig. 567). The illustration is from "Gardening."

SOIL FOR VINEYARDS.

The long-established practice of highly enriching the deep vine borders of exotic grape-houses formerly misled some cultivators into the practice of heavily manuring the ground intended for vineyards of hardy American varieties. It is now fully proved that land of moderate fertility is much better. Rich soils produce a strong growth of canes and leaves, at the expense of the fruit, and render the wood more liable to winter-killing. A considerable proportion of clay in the soil, provided there is a perfect underdrainage, is better than light sand or gravel. The most successful vineyards are planted along the borders of large open waters, where the soil is composed of what is termed *drift*—giving a perfect natural drainage. The south shore of Lake Erie, from Dunkirk to Sandusky, extending a few miles inland, and the borders of Keuka Lake, in Western New York, have proved to be admirably adapted to vineyard culture; and other places in proximity to open water, away from frequent fogs, and with a loose or shelly soil, will doubtless be found equally good.

While such localities as these should be sought for extended or market cultivation, in nearly every portion of the country vines for a family supply may be raised by proper underdrainage, and the selection of hardy or productive sorts.

At the same time that moderate fertility is to be sought constant cultivation must be given through the growing season. The best managers pass the cultivator once a week.

The slow-growing varieties, such as the Delaware, should have a richer soil than more rapid growers. Grapes on highly manured land will grow larger, and present a more showy appearance—but the fruit at the same time will be more watery, and of inferior flavor.

DISTANCES FOR PLANTING.

The European practice of placing the vines about four feet apart, each way, and training to a single stake, has been adopted to a considerable extent. It succeeds best on poor and light soils, and with the slower growing sorts. Although it does well for a few years, it is not to be generally recommended. Young cultivators also fall into the error of placing their vines too near together, when trained with horizontal arms on a common trellis. They bear and succeed well while young, but as they become older require more room. It is a common practice to place the lines of trellis eight feet apart, and the vines nine feet from each other, along each line of trellis. This distance appears to answer well; but some of the best managers give at least twelve feet each way, and others as much as sixteen feet. The space thus given not only tends to a more healthy growth and freedom from mildew, but develops larger, finer, and more perfect grapes.

RAISING GRAPES FROM SEED.

NEW VARIETIES.—Procure well-ripened grapes, wash the seed from the pulp, and mix them at once with moist sand or leaf-mould. Bury them in open ground till early spring. They should not be allowed at any time to become dry, and care should likewise be taken to prevent their becoming water-soaked. They should, in fact, be treated as cherry-stones and pear-seeds are managed by nurserymen. Be careful to secure them from mice. Plant in spring, in beds of *deep, rich soil*, in drills a foot or two apart, and an inch or two apart in the drills, and about an inch deep. Shade the young plants for a few weeks. Provide small stakes for their support, and mulch the surface with an inch or so of good fine

manure. If dry weather occurs, give the ground a thorough soaking as often as once a week. Lay down and cover in winter. The great point is a *deep* and *rich* soil, so as to give the young plants a vigorous start.

ARRANGEMENT OF VARIETIES.

CLASS I. *Dark red, purple, or black.*

CLASS II. *Light red or brown.*

CLASS III. *White, yellow, or green.*

CLASS I. *Dark red, purple, or black.*

Adirondac.* Bunches rather large, compact, shouldered; berries medium, round; skin thin, dark, nearly black, covered with a delicate bloom; flesh tender, with little or no pulp, with a mild, sweet, agreeable flavor. Vines and leaves resemble those of the Isabella, and are about as hardy. They are somewhat liable to mildew. Ripening very early, or with the Hartford Prolific, and successful and valuable in warm localities.

Alexander. (Cape Grape, Schuylkill Muscadel, Spring-Hill Constantia.) Bunches not shouldered, compact; berries medium, nearly round, slightly oval; skin thick, black; pulp firm, coarse, acid until fully ripe. Season late. Worthless in New England and New York; good farther South. A native of Pennsylvania.

Alvey. Bunches medium, loose, shouldered; berries small, round; skin thin, black; bloom thin, blue; flesh without pulp, vinous. A strong grower. Good in quality; not profitable. Pennsylvania.

Barry. (Rogers' No. 43.) Bunch rather large, short, and broad, rather compact, sometimes shouldered; berry large, roundish, black; flesh nearly free from pulp, sweet and agreeable. Rather early, ripening with Concord. Vine a strong grower and good bearer. Massachusetts.

Breckman's. Bunch medium, compact, very round, dark wine color; flesh juicy, vinous, rich; pulp tender. A cross between Clinton and Delaware. Very good. Ripens September. South Carolina.

Black Eagle. Bunch large, long, shouldered, not very compact; berry above medium, roundish oval, black; slight bloom; flesh vinous, high flavor, small, tender pulp. Slow grower. Quality varies in different localities and subject to rot. September.

Brighton.* Bunch medium or rather large, shouldered, moderately compact, berries full medium in size, round, dark red or maroon when fully ripe, with a purple bloom; flesh tender, pulp slight, quality very good. Vine a vigorous grower, very productive, rather early; valuable. A cross of the Concord and Diana Ham-burgh, and one-fourth exotic. New York.

Brilliant.* Bunch large, conical, shouldered, compact; berry large, round, nearly black; flesh sweet, juicy, rich, vinous; pulp tender. A cross of Delaware upon Findly. Ripens a little earlier than Concord. Valued in the South. Texas.

Campbell's Early. A strong, healthy grower; bunch large, handsome, well shouldered; berries large, black, flesh tender, rich, sweet. Ripens before Concord. Promises to be of great value for the early market. Ohio.

Carman.* Cluster medium, cylindrical, rather loose; berries medium, round, purplish-black; skin thin and tough; pulp tender, nearly sweet, good. Very late, ripening with Catawba. A seedling of the Post Oak crossed with Triumph. Valued in the South. Texas.

Catawba.* Bunches medium in size, shouldered; berries large, deep coppery red, becoming purple when fully ripe; flesh slightly pulpy, juicy, sweet, aromatic, rich, slightly musky. Very late. Does not ripen well as far north as 43° latitude, except in warm exposures. Very productive. North Carolina.

Cayuga. Bunch small, long; berry medium size, round, inclining to oval, black; light thin bloom; pulp white, juicy, tender. September.

Clinton. Bunches medium or small, not shouldered, compact; berries nearly round, small, black; bloom thin, blue; pulpy, juicy, with a slightly harsh flavor. Very hardy and late. Western New York. Requires thorough maturity to develop its flavor. A good keeper. Chiefly valuable for wine.

Concord. Bunches compact, large, shouldered; berries large, round, almost black, covered with bloom; skin very tender; flesh juicy, buttery, sweet. Ripens ten days before the Isabella; is healthy, vigorous, and very productive. The extreme hardness, vigor, and productiveness of the vine, and the large size and fine appearance of the bunches and berries, have rendered the Concord one of the most popular market sorts, although inferior to several others in flavor. It succeeds well throughout the entire West. The fruit is too tender for shipping long distances. Massachusetts.

Cornucopia. (Arnold's No. 2.) Bunch large, compact, shouldered; berry above medium, black; flavor pleasant, very good; ripens with Concord. A cross of Clinton and Black St. Peter's. Hardy productive. Said to split badly.

Cottage. Bunch small, sometimes shouldered; berry large, round, black; pulp tough, sweet, somewhat foxy. Mid-season. Massachusetts.

Creveling. Bunches medium, rather loose, shouldered; berries rather large, nearly round, black, with little bloom; flesh with a rather sweet and an excellent flavor. Vine hardy and vigorous. Early, ripens nearly with the Delaware. Pennsylvania. The bunches on the young vines are often quite loose, but afterward become more compact.

Cynthiana. Bunch moderately compact, shouldered; berries small, round, black. Resembles Norton's Virginia, but better. Season early. Popular in some parts of the South. Arkansas.

Early Victor. Bunch medium, rather compact, often shouldered; berry medium in size, round, black, with a blue bloom; quality very good. Quite early. Vine hardy, vigorous, and productive; a valuable early sort. Origin, Kansas.

Eaton. Bunch large, shouldered; berry very large, round, black; blue bloom; juicy, tender. Uncertain ripener in some localities. Seedling of Concord.

Elsinborough. (Elsinburgh.) Bunches rather large, loose, shouldered; berries quite small; skin thin, black; blue bloom; pulp none; melting, sweet, excellent. Leaves deeply five-lobed, dark green; wood slender; joints long. Hardy. New Jersey.

Essex. (Rogers' No. 41.) Berry large, tender, sweet; bunch short, shouldered. Ripens with Concord.

Eumelan.* Bunch medium in size; berry rather small, black, tender, sweet, excellent. Vine moderately vigorous. A good bearer if planted in a mixed vineyard. Mid-season. New York. One of the best table grapes.

Hartford.* Bunches large, shouldered, rather compact; berries rather large, round; skin thick, black, with a bloom; flesh sweet, rather juicy, with some toughness and acidity in its pulp; ripens one week before the Concord. Hardy, vigorous, productive. Valued for its earliness and easy cultivation. Recommended only for market. Connecticut.

Herbmont. (Warren, Neal.) Bunches large, compact, shouldered; berries small, round, dark blue or violet, with a thick, light bloom; skin thin; pulp none, with a sweet, rich, vinous, aromatic juice. Late. Vigorous grower. Tender at the North. Succeeds well as far south as Cincinnati.

Herbert.* (Rogers' No. 44.) Berry medium, sweet, a little pulpy; good; bunch rather loose; moderately productive. Blooms early. Ripens with Concord. Massachusetts.

Highland. Bunch large, long, shouldered; berry large, round, black; blue bloom; flesh white, juicy, sweet. Ripens late.

Hosford. Bunches large, shouldered, berry very large, round, black; flesh tender, juicy; flavor sweet. Good. Michigan.

Isabella. Bunches rather large, shouldered; berries round oval, rather large; skin thick, dark purple, becoming nearly black; bloom blue; tender, with some pulp, which lessens as it ripens; when fully ripe, juicy, sweet, rich, slightly musky. Ripens in favorable aspects as far north as 43° lat., except in cold seasons. Very vigorous; profusely productive. Origin, South Carolina. The *Garrigues*, *Payn's Early*, and *Louisa* claim to be earlier than the *Isabella*, but differ from it little if any.

Israella. Bunches medium, shouldered, very compact; berries medium, slightly oval, black; flesh tender to the centre, with a peculiar, rich, and pleasant flavor. Early, ripening with Concord. Vine vigorous, healthy, and hardy. Peekskill, N. Y. Keeps well.

Ives.* Bunch medium, compact, shouldered; berry rather small, roundish-oval, black, with some pulp; of moderate quality; its chief value for wine. Origin, Cincinnati, Ohio. Season medium, or rather early.

Lawrence. Bunch large, conical; berry medium, round, purple to black; pulp firm, breaking; flavor sub-acid, free from mildew. Pennsylvania.

Lenoir. Bunches large, handsome, compact, little shouldered; berries small, round; skin thin, dark purple; bloom slight; tender, with no pulp; melting, sweet, excellent. Wood long-jointed; leaf three-lobed. Origin, Carolina. Closely resembles Herbe-mont.

Logan. Bunches medium, shouldered, compact; berries rather large, oval, black; flesh juicy with little pulp, and a moderate flavor. Vine a slender grower; leaves small, three-lobed. Early.

Merrimack. (Rogers' No. 19.) Bunch medium, rather short; berry large, round, black; flesh tender, sweet, of good quality. Mid-season. Massachusetts.

Miles. Bunch and berry small; juicy, vinous, good. Hardy, moderate grower; productive.

Mills. Bunch large, long, shouldered; berry large, round, black; thick skin; flesh juicy, rich, vinous. Ripens with Concord.

Missouri. Bunches loose; berries small, round; skin thin, nearly black; tender, sweet, pleasant, with little pulp; moderately productive; growth slow; wood short-jointed; leaves deeply three-lobed.

Moore's Early.* Bunch medium, berries large, black, with a heavy bloom; quality only fair. Ripens about two weeks before Concord. One of the most largely grown and profitable early market grapes. Massachusetts.

Mottled. Bunches medium, compact; berries medium, round, mottled, changing to purple; sweet and sprightly, very good. Ripens soon after Delaware; hangs long. Kelly's Island, Lake Erie.

Norton.* Bunches long, moderately compact; berries small, round; skin thin, dark purple; pulpy, vinous, somewhat harsh, rather pleasant and rich. Season early. Shoots strong, hardy. Mostly grown at the South and West for making wine. Virginia.

Ohio. (Longworth's Ohio, Segar-Box.) Bunches large, long, loose, tapering, shouldered; berries small, round; skin thin, purple; bloom blue; tender, melting, sweet, excellent, with no pulp; a good bearer. Shoots long-jointed, strong; leaves large, three-lobed. Origin unknown. As far south as Cincinnati it succeeds well, but tender farther north.

Raabe. Bunches small, compact, rarely shouldered; berries small, round, dark red; thick bloom; flesh very juicy, scarcely any pulp. Good. Philadelphia.

Senasqua. Bunch medium, sometimes large, compact; berry medium, purplish black, tender, juicy, free from pulp, becoming sweet when fully ripe. Very good. Origin, Croton Point, N. Y. A cross of Concord and Black Prince.

Telegraph. Bunch above medium, compact; berry rather large, round, black, juicy, with some pulp, of moderate quality, valuable for its earliness (ripening about the same time as Hartford); vine hardy, vigorous. Origin, near Philadelphia. Pa.

To-Kalon. Bunches large, shouldered; berries varying from oval to oblate, dark, with a bloom; sweet, excellent, without foxiness, toughness, or acidity. Perfectly hardy, and with good treatment an early and abundant bearer. A little earlier than the Isabella. Lansingburg, N. Y. Liable to rot, and variable in ripening and quality.

Union Village. (Ontario.) Bunches very large, compact, shouldered; berries very large, round; skin thin, black, with a bloom; sweet, with a pleasant, moderate flavor. A good and very showy sort; rather tender at the North.

Vergennes.* Bunch large, compact; berries large, dark purple, with green markings; quality very good. In season after Concord, and very long keeper. Susceptible to disease. Valued for market in some sections. Vermont.

Wilder.* (Rogers' No. 4.) Bunch large, compact, shouldered; berry large, round, black with a thin bloom; flesh tender, with a little pulp, sweet, slightly aromatic, of very good quality. Ripens with Concord. Succeeds in many localities. Massachusetts.

Worden.* Resembles Concord, but rather larger, much superior in quality, and a few days earlier. Said to be a seedling of Concord. Very popular for home use and for market. Valuable. New York.

CLASS II. *Light red or brown.*

Agawam.* (Rogers' No. 15.) Bunch large, moderately compact, and shouldered; berry large, nearly round, dark dull reddish-brown; flesh tender, little pulp, very slightly partaking of the foxy aroma; of good vinous flavor. Season medium, or soon after Concord. Vine a strong grower and great bearer, but easily susceptible to disease. Massachusetts.

Amber. Bunch medium, loose, tapering; berry large, round, light red; thin bloom; pulp tender, juicy, sub-acid, rich. A weak grower.

Bland. (Bland's Virginia, Powell.) Bunches loose; berries round, pedicles long; skin thin, pale red; flesh slightly pulpy, pleasant, delicate, sprightly. Late. Rarely ripens well as far north as 43° lat. A moderate bearer. Origin, Virginia.

Delaware.* Bunches small, compact, generally shouldered; berries smallish, round; skin thin, light red, translucent; exceedingly sweet, aromatic. Early. A vigorous grower under high culture; requires a strong, rich soil. An early and profuse bearer. Hardy. One of the most excellent and popular of all American grapes, especially at the North and East. Often injured by over-bearing, and badly attacked by disease unless sprayed. Origin unknown.

Diana. A seedling from the Catawba, which it resembles, but paler, or a pale grayish red. Bunches compact; berries round, almost without pulp, juicy, sweet, rich. It ripens best on poor soils. Mid-season. Origin, Milton, Mass.

Catawba, see last class.

Diana Hamburg. Bunches large, compact, shouldered; berries large, round, dark red when fully ripe; tender, free from pulp, sweet, aromatic. Season between Concord and Diana. Raised from seed of the Diana impregnated with Black Hamburg, by J. Moore, Rochester, N. Y. A slow grower.

Golden Campbell. Bunch rather small, cylindrical; berry below medium, oval, yellow; flesh white, juicy, vinous. A seedling of Moore's Early.

Goethe.* (Rogers' No. 1.) Bunch rather large, moderately compact, shouldered; berry quite large, oval, yellowish-green, often more or less blotched or shaded dull red; flesh tender, with no pulp; sweet, slightly aromatic, and when well ripened of excellent quality. Rather late, occasionally ripening well at the North, better at the South. Vine vigorous and productive. This has more of the exotic character than any other of Rogers' hybrids, and therefore less reliable and more subject to mildew. Massachusetts.

Iona.* Bunches large, shouldered, not compact; berries medium, round, pale red, becoming dark red at maturity; flesh tender, with little pulp, and with a rich, slightly vinous, excellent flavor. Peekskill, N. Y. Fails in many localities, and often much injured by disease and overbearing. Mid-season. Must be sprayed.

Jefferson. Bunch rather large, shouldered, compact; berry full medium in size, roundish oval, light red, quality excellent. Vine healthy and vigorous, and very productive. Season medium. Raised by J. H. Ricketts, Newburg, N. Y.

Lindley. (Rogers' No. 9.) Bunch medium in size, rather long and compact; berry medium, nearly round, reddish, sweet, slightly aromatic, very good when well grown. Rather early. Vine vigorous and productive. Massachusetts.

Massasoit. (Rogers' No. 3.) Bunch medium, rather loose; berry rather large, roundish, light red, sweet, good. Mid-season. Vine moderately vigorous. Massachusetts.

Michigan. Bunches large, often two-shouldered; color resembling Catawba, but redder, juicy, sweet, rich, with a fine perfume. Ripens two weeks before Catawba.

Northern Muscadine. Bunches small, short, compact; berries medium, round, brownish red; skin thick, with the character and odor of the brown Fox grape. The berries fall from the bunch as soon as ripe, which is about one week before Concord. New Lebanon, Columbia County, N. Y. Valuable only for its earliness and extreme hardness.

Salem. (Rogers' No. 22.) Bunch large, short, rather compact; berry large, round, dark dull red; tender, nearly free from pulp, of a moderate but very agreeable flavor. Season medium. Vine vigorous and productive. Succeeds in many localities, mildews in others. Massachusetts.

Scuppernong, see next class.

Venango. Bunches compact; berries fine lilac; pulp tough, but with a peculiar, aromatic flavor, which makes it valuable for kitchen use. Two weeks before Catawba. Vigorous. Hardy.

Walter. Bunch moderate in size, shouldered, compact; berry medium, round, light red; skin thick; flesh sweet, aromatic, of excellent flavor. Season medium. Origin, Poughkeepsie, N. Y. A cross of Delaware and Diana.

CLASS III. *White, yellow, or green.*

Allen. (Allen's Hybrid.) Bunches rather large, shouldered, compact; berries medium, round; skin thin, pale, amber when fully ripe; flesh tender without pulp, with a sweet, rich, delicious flavor. A hybrid between native and exotic species. Moderately hardy. Much liable to mildew. Season medium.

Anna. Bunches large, loose, shouldered; berries large, white, with a thin white bloom; flesh tough at the centre; juice between pulp and skin sweet and excellent. October—too late for ripening at the North. A seedling of the Catawba.

Cassady. Bunches medium, compact, sometimes shouldered; berries small, round, greenish white, sometimes with a pale amber blush; flesh juicy, little pulp, flavor pleasant, good. Philadelphia. Strong grower. Leaves woolly beneath. Fails in some localities.

Clara. Bunches medium, loose; berries medium, round, green; flesh tender, juicy, rich, sweet, and delicious. Philadelphia. Of foreign parentage.

Croton. Bunch medium in size, not very compact, shouldered; berries varying from small to medium, light greenish yellow; skin thin; flesh juicy, sweet, with an excellent pleasant flavor. Ripens early. A cross of the Delaware with the Chasselas. Liable to mildew in some localities.

Cuyahoga. Bunches medium, shouldered, compact; berries rather large, round, pale greenish white; bloom thin; flavor moderate. Too late for the North and liable to mildew.

Diamond.* Moderately vigorous, productive, hardy; bunch large, compact, shouldered; berries large, yellowish-green, juicy, melting, good. Season a week before Concord. Valuable for early market and home use. New York.

Duchess.* Bunch medium, sometimes large, shouldered; berries moderate in size, light green, tinged with pale yellow and amber; tender, free from pulp, sweet, rich, and excellent in quality. One-fourth exotic. Season medium. Ulster County, N. Y.

Empire State. Bunch rather large, shouldered; berry medium, yellowish white, rich, sweet, sprightly, very good. Early. A cross of Hartford and Clinton. Newburg, N. Y.

Green Mountain.* Bunch small, compact, sometimes shouldered; berry medium, oval, greenish-white; thin bloom; pulp tender, juicy, very sweet and rich. Early. Free from rot and mildew. The berries hang well to the stems. An excellent grape for the table or early market.

Green Golden. Bunch medium, long stem, compact, regular; berry large, round, greenish-white, very juicy, acid. A handsome grape. Poor shipper.

Hayes. Bunch medium, cylindrical, shouldered; berry below medium size, round, yellowish-white; pulp rich, juicy, vinous. Early. Massachusetts.

Lady Washington. Bunch quite large, shouldered; berry medium, round, pale greenish-yellow, often tinged with pink, quality medium. Season rather late. A cross of Concord and Allen's Hybrid, and one-fourth exotic. Variable. Newburg, N. Y.

Lydia. Bunches above medium, berries large, oval, greenish white, with a tinge of rose in the sun; sweet, excellent. Ripens with the Delaware. C. Carpenter, Kelly's Island, O.

Martha. Bunches medium, rather loose, shouldered; berries large, round, pale yellow; slightly pulpy, sweet, juicy, a little foxy. Vine a hardy, healthy, and strong grower. A seedling of Concord.

Mary. Bunches quite large, loose; berries medium, round, nearly white, translucent; flesh tender, little pulp, sweet and sprightly, very good. Rather late. Kelly's Island.

Maxatawney. Bunches medium, moderately compact, not shouldered; berries light greenish yellow, tinged with amber; flesh tender without pulp when ripe, quality excellent. Vine hardy. Ripens rather late. The Maxatawney much resembles the Rebecca in flavor and general appearance; but while it is hardly equal to the latter in quality, it is a better grower. Berks County, Pa.

Niagara.* Bunch rather large, slightly shouldered; berry nearly round, pale green becoming partly yellow, medium in quality. Medium late. Vine possessing great vigor and productiveness. A cross of Concord and Cassady. The standard white grape for market in the East. Lockport, N. Y.

Pocklington.* Bunch medium, shouldered, compact; berry large, pale greenish yellow, pulpy, with good flavor when fully ripe. Season rather late. Vine hardy, healthy, productive. A showy and attractive grape. A seedling of the Concord. Origin, Sandy Hill, N. Y.

Prentiss. Bunch medium, sometimes shouldered, compact; berry medium, roundish oval, greenish white becoming tinged with pale yellow; sweet, and very good in quality. Slow grower. Season medium. A seedling of the Isabella. Steuben County, N. Y.

Rebecca.* Bunches nearly cylindric, compact, heavy, often shouldered; berries, medium, oval; color light green in the shade, golden in the sun, with a light bloom, somewhat translucent; flesh juicy, sweet, delicious. Ripens nearly with Concord, and keeps a long time. When fully ripe, one of the finest flavored of all grapes. Moderate grower, but does well when grafted on strong growing sorts. For home use only. Foliage tender. Hudson, N. Y.

Scuppernong. (Fox Grape or Bullet Grape of the South, American Muscadine.) This is a distinct Southern species, the *Vitis vulpina*. Bunches very small, loose; berries round, large; skin thick; pulpy, juicy, sweet, strongly musky. The "White" is light green, the "Black" dark red; the color of the tendrils corresponding in each variety. Leaves quite small, glossy, on both sides. Tender at the North. Valuable for the South. North Carolina.

Taylor's Bullet. Bunches medium, loose, with many imperfect berries; berries rather small, greenish-white, of moderate quality. A strong grower. Kentucky.

CHAPTER XXVI.

THE MULBERRY

Has generally been planted as an ornamental tree, but with exception of Teas' drooping mulberry the varieties are generally too irregular and spreading in growth to compete with other trees not possessing their fruit-bearing advantages.

To many the flavor of the mulberry is not attractive, but to others its rich sub-acid sweetness and the long continuance of its season commend it to favor.

Probably no fruit has been so neglected as the mulberry. The Chinese have cultivated the tree from time immemorial as food for the silkworm, and the craze which spread over this country seventy years ago in the same direction is a matter of history.

The berries are of varying size and color, largest on old trees.

The varieties worthy of cultivation are not numerous, and are mostly not hardy in the North. The practice of substitution is so common among nurserymen that it is not easy to obtain trees true to name. It will grow in any well-drained soil, but appears to prefer one which is rather light and gravelly. At full size the trees are twenty to thirty feet high, with round open heads; the berries as they mature drop off and may be gathered from the ground. A slight jarring will shake the ripe ones off, and this is the best mode of gathering them.

The most complete monograph on the fruit-bearing mulberry is that of L. H. Bailey, Cornell Experiment Station of New York. He classifies those grown in America thus:

1. The White Mulberry group.—*Morus alba*.
 1. (a) Russian mulberry.—Var. *Tatarica*.
 2. (b) Nervosa mulberry.—Var. *venosa*.

2. The Multicaulis group.—*Morus latifolia*.
3. The Japanese group.—*Morus Japonica*.
4. The Black Mulberry group.—*Morus nigra*.
5. The Red or Native Mulberry group.—*Morus rubra*.
5. (a) Lampasas mulberry.—Var. *tomentosa*.

He says: "Mulberries can be propagated by cuttings of the ripe wood or of roots. Cuttings start best under glass. Some nurserymen propagate by short cuttings indoors, starting them in February or March. The cheap Russian mulberry stocks, from the West, have supplanted cutting-propagation very largely. The named sorts are grafted upon these Russian roots in winter, with fair success, in the same manner in which apple-trees are root-grafted, or they are sometimes crown-grafted, the stocks for this purpose being grown in pots or boxes. Ordinary fall budding in the field is not successful with mulberries, but spring budding gives good results. Spring budding has been employed and recommended certainly for thirty years, but it does not yet appear to be a common practice. S. D. Willard, Geneva, N. Y., who grows quantities of mulberries, has several times shown me his stock, which is propagated by spring scion-budding. This is performed just before the foliage is out, or as soon as the bark slips freely. Fig. 74 explains the operation. The incision in the stock is the same as for the ordinary fall budding. The scion carries one or two buds, and is cut upon one side only. This prepared side is inserted next the wood in the stock, and is held in place by string, as for fall budding."

VARIETIES.

Downing.* (Downing's Everbearing.) Large, black, sub-acid, very good. Prolific, but not entirely hardy in Northern States. A valuable sort, not readily obtained, as New American is commonly substituted for it. The leaf of the latter is smaller and not so pointed. Fig. 568. New York.

Hicks. (Hicks' Everbearing.) Medium, very sweet; good. Tree vigorous and a profuse bearer. Season extends over three or four months. Kentucky. Fig. 569.

Johnson. Very large, black, two inches by three-fourths of an inch, sub-acid. Tree strong, irregular, poor bearer. Ohio. Being superseded by other varieties.

New American.* Large, from one to two inches long, glossy. Tree strong, vigorous, very productive, hardy. Fruit begins to ripen in June and continues into September. The best variety for Northern States. Fig. 570. New York.



FIG. 568.—Downing Mulberry. FIG. 569.—Hicks. FIG. 570.—New American.

Russian. Tree spreading, drooping, hardy; fruit produced in great abundance over a long season, purplish-black to cream white. Worthless for table use, but good to attract birds away from more desirable fruit. It is a form of *Morus alba*. The nursery trees are grown from seeds, and therefore they are very variable. There are some good strains for eating, and three or four of these have been given distinct names.

Stubbs. Large, two inches by three-quarters, deep black, rich, sub-acid. Extremely prolific. Very valuable for the South. Georgia.

Peas Weeping. Fruit small, reddish, of little value, but the tree is so very pronounced in its weeping habit that it is desirable as an ornament for lawns. Tree dwarf, slow grower. Seedling of Kaskaskia, Missouri.

CHAPTER XXVII.

NECTARINES.

THE Nectarine being nothing more than the peach with a glossy skin, the same rules for cultivation will apply equally to both (see Chapter XXIX.), with the exception that, as its smooth surface renders it eminently liable to the attack of the curculio, special attention must be given to the destruction of this insect. Not much grown in the East.

The nectarine is usually inferior, and has more of the *noyau* flavor than the peach, and the shoots are of smoother and more compact growth.

DIVISION I.—FREESTONES.

CLASS I. FLESH PALE.

Section 1. Leaves with reniform glands.

Downton.* Medium in size, roundish oval, pale green, with a deep violet-red cheek; flesh pale green, slightly red at the stone, melting, rich, excellent. Ripens early. Flowers small. English.

Early Violet.* (Violet Hative, Aromatic, New Scarlet, Large Scarlet, Early Brugnion, Violet Musk, Violette Musquée.) Size medium, roundish; apex slightly narrowed; suture shallow; skin with a dark purple-red cheek and brown dots, on pale yellowish-green; flesh whitish, much reddened at the stone; stone roundish, moderately rough, reddish or reddish-brown; flesh melting, rich, high-flavored, and aromatic; of the finest quality. Season very early. Flowers small. Distinguished from Elruge by its redder flesh and stone, and darker skin. France.
The *Large Early Violet*, or *Violette Grosse*, differs in its larger size and rather inferior flavor.

Elruge.* Medium in size, roundish oval, suture slight, distinct at apex; skin a dark red or deep violet on a greenish-yellow ground, with minute brownish dots; flesh greenish-white, slightly, sometimes scarcely, stained with pale red at the stone; juicy, rich, high-flavored; stone rough, pale. Flowers small. Season about medium, or first of autumn. This is one of the best and most celebrated of nectarines. England.

Hardwicke. Large, roundish, approaching oval, resembling Elruge; skin with a violet-red cheek on pale green; flesh greenish white, slightly reddened at the stone, juicy, rich, high-flavored. Flowers small. Season medium or end of summer. English. A favorite in Southern California.

New White.* Rather large, nearly round; skin white, often a slight tinge of red; flesh white, tender, juicy, rich, vinous; stone small. Flowers large. Season medium, or first of autumn. English.
The *Old White* resembles the preceding, but is less hardy and productive.

Telliers. Rather large, roundish oblong; apex slightly narrowed; base broad, pale green, with a marbled purple-red cheek; flesh pale red at the stone, juicy, sweet, good. Flowers small. Rather early, or end of summer.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves serrate, without glands.

Hunt Tawny. Nearly medium size, roundish ovate, narrowed and pointed at apex, one side slightly enlarged; skin a dark red cheek on pale orange, with numerous russet specks; flesh deep orange, rich, juicy, good. English. Flowers small. Valuable for its early maturity, ripening quite early, or three weeks before the close of summer. Often mildews badly.

Section II. Leaves with reniform glands.

Boston.* (Perkins, Lewis.) Large, handsome, roundish-oval; bright yellow, with a deep red cheek; flesh yellow to the stone, with a good, pleasant flavor. Flowers small. Season medium, or about the first of autumn. A native of Boston.

Pitmaston. Large, roundish ovate, base broad, apex narrow and pointed; surface with a dark reddish cheek, slightly streaked at the margin, on rich orange; flesh deep yellow, red at the stone; juicy, rich, fine. Flowers small. Stone rather small. Rather early.

DIVISION II.—CLINGSTONES.

CLASS I. FLESH PALE.

Section I. Leaves serrate, without glands.

Early Newington.* (Black, Early Black, Lucombe's Seedling.) Large, roundish ovate, one side slightly enlarged, apex pointed; skin pale green, nearly covered with bright red and with darker marblings and dots; flesh greenish-white, deep red at the stone, juicy, with a fine, rich flavor. Flowers large. Early. England.

Newington. (Scarlet Newington, Scarlet, Old Newington, Smith's Newington, Anderson's.) Rather large, roundish; nearly covered with red and darker marblings, on pale greenish yellow; flesh deep red at the stone, juicy, rich, vinous. Rather late. Flowers large. Best when ripened to shrivelling.

CLASS II. FLESH YELLOW.

Section I. Leaves with reniform glands.

Red Roman. (Roman, Old Roman, Brugnion Musquée.) Large, roundish, a little flattened at apex; skin greenish-yellow, with a somewhat rough, dull reddish-brown cheek, with brown russet specks; flesh firm, greenish yellow, deep red at the stone, rich, vinous, high flavored. Flowers large. Season medium or rather late.

CHAPTER XXVIII.

NUTS.

THE introduction of mainly Japanese varieties of chestnuts and walnuts has created an interest in the growth of our native nuts, too long delayed, which will unquestionably contribute much to pleasurable and profitable cultivation of land.

In this country a crop of nuts of any value has heretofore been generally considered an adventitious, an accidental wind-fall, to be prized by the lucky owner of a tree which produces fruit of unusual size and in large quantity. Few attempts have been made to propagate from such trees, and when it has been, it has usually resulted in complete failure.

Nut trees have been treated as one would an apple, or peach; transplanted trees invariably died and grafted ones fared no better. Within the past few years more careful study has been made of the difficulties which have heretofore discouraged experiments in this direction.

It is not at all so easy a matter to raise any of our native nuts as it is the soft fruits. Unless nursery grown, and that properly too, they are all intolerant of removal, and grafting is too commonly a failure; besides this, they do not come into bearing, excepting in the Southern States, until of considerable age.

Notwithstanding the inherent and persistent character of some of these drawbacks, the results to be obtained fully justify the necessary care and skill which will in a measure overcome them.

A new and most interesting, valuable, and pecuniarily profitable industry is within reach of all who will avail themselves of it.

So new is it that practically it has no nomenclature. Here and there have appeared in the market, from year to year.

some enormous hickory nut, an immense chestnut, a nearly finger-long pecan, the product of some unknown tree, "back in the country," but save for its annual appearance and immediate sale at a big price, the unknown has remained unlocated and unnamed. Consequently the list of identified varieties is very small. It will doubtless increase with rapidity.

While the extraordinary size and appearance of nuts, as in soft fruit, will always have a favorable influence in their sale, it should not be overlooked that it is often the case that small nuts may have proportionately larger meats and be of sweeter and higher flavor than larger ones. Each variety should be judged upon its individual merit.

Wherever there is a tree which produces nuts which possess apparent superiority over others, the owner should send specimens, with the fullest description of the tree, its probable age, location, and peculiarities to the Agricultural Experiment Station of his State (see p. 272), and thus aid in the development of this new industry.

PROPAGATION.

It is generally conceded that the surest way to grow nut trees is to plant the nuts. As with all other trees, this is not, after all, the slowest way to obtain good, healthy, long-lived trees. The height that even the slow-growing hickory will reach at two years, if properly managed, will astonish most persons,

The vitality and germinating power of nuts is greatly impaired by loss of moisture, so that but a small proportion will sprout if kept out of ground and not planted until the following spring. Gather them as soon as they fall in the autumn, spread them upon the ground, cover with three or four inches of sand, and upon that as much nice loam. Under this covering, exposed to the weather, a large percentage will keep in good condition through the winter. As soon as the ground can be worked take them out and plant in rows, about six inches apart. The following spring dig them up, cut off about one-half of the tap-root and plant again. The next year follow the same course, and the third year plant out where

they are to remain. The length of the tap-root of a one- or two-year-old hickory or pecan is something wonderful, and readily accounts for the difficulty of successfully transplanting them, either from the fields or nursery. It is commonly two or three times as long as the shoot above ground, and as received from nurserymen it is more often as bare of fine roots as a parsnip. It is little wonder then that sometimes it stands dormant and seemingly dead through the whole of the first season, to start slowly into growth the second summer after transplanting. Rich soil, good cultivation, with shortening of the tap-root as above directed, should give a good growth of fibrous roots while in the nursery rows, and conduce to successful subsequent transplanting.

This method will usually produce strong, vigorous young trees. The drawback to this method is that nut trees do not come absolutely true from seed; at the same time a good stock is likely to reproduce most of its good qualities.

Mr. E. H. Van Deman, late U. S. Pomologist, says: "The variation of seedlings is so great that, with nuts as well as other fruits, the only sure method of reproducing a variety is by budding or grafting." This is a more difficult operation with nut-bearing trees than with most others. However, it can be done, and with each year we are learning better how to do it.

At present the best-known method is to work upon one- or two-year-old seedlings, either in nursery rows or where seeds have been planted in the orchard. They should be cut some two or more inches below the surface of the ground, or just above where the roots begin to swell, and a scion inserted not less than five or six inches long and having a terminal bud if possible. The "tongue" graft is the best for small stocks. No wax is needed for this underground grafting, but some bandage should be used to hold the parts firmly in place. Cotton strips dipped in hot grafting-wax and then dried are very good. A ball of wet clay may be pressed about the wound and the earth packed to near the top of the scion to stop evaporation. A very important point, and one that must not be overlooked, is that the scions should be cut early, before any signs of starting, and put in some cool, damp place until after the stocks have begun to grow. In the sawdust of an

ice-house is a safe place, or buried in earth where the sun will not warm it early; otherwise they are apt to start too early.

Prong Grafting is recommended by B. M. De Long, in the excellent monograph on nut culture, recently issued by the U. S. Department of Agriculture,* as follows:

"In this method the prongs or extremities of the branches are used. Fig. *a* represents the scion or prong used, and the



FIG. 571.—Prong Grafting.

method of cutting it from the branch. The prong is cut as illustrated, and the wood on the prong (graft) is partly removed, being gouged out with the point of the budding-knife. This is done to allow the inner bark of the bud to unite with the inner bark of the stock, which union would be prevented if the wood should be allowed to remain in the bud. After the wood on the bud has been partly removed, as shown in Fig. *b²*, the stock is cut off with a sharp saw, smoothed over with a knife, and the graft inserted as shown in Fig. *c*, and tied tight; no less than eighteen-ply twine should be used. The cuts are waxed over with grafting-wax. After the grafts have started they should be examined and if the twine is found to begin to cut into the stocks it is untied and tied on again; this will prevent further injury. The object of allowing the twine to remain a longer time is to prevent the cut

* "Nut Culture in the United States, Embracing Native and Introduced Species." Report by S. B. Heiges, Pomologist. Large octavo, pp. 141, 16 plates. U. S. Department of Agriculture, Division of Pomology, Washington, Government Printing Office.

bark from warping open by the action of the atmosphere, thus causing the graft to die."

Cleft Sap Grafting.—As this differs somewhat from cleft grafting as described on page 33, and is claimed by Felix Gillet, of California, to succeed with walnuts, his method is thus described: "If done early in the spring when the sap is commencing to flow, it can be used on limbs as large as three and

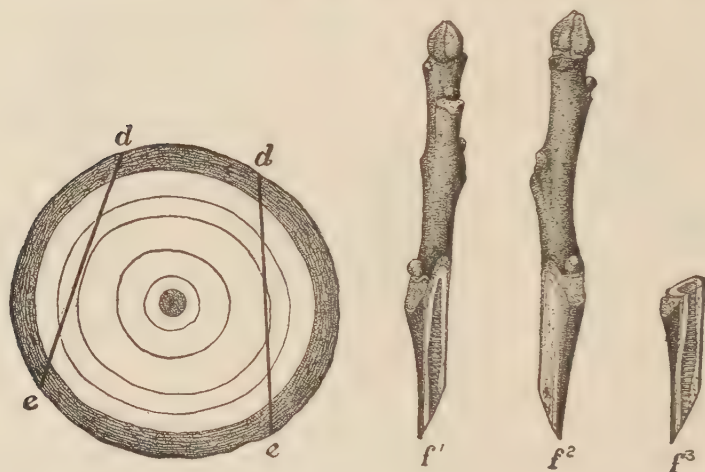


FIG. 572.—Cleft Sap Grafting.

a half inches in diameter. The stock is sawed off and smoothed as for ordinary cleft grafting. Instead of making a single cleft through the centre, two are made, one across the stub at each side of the centre (Fig. *d*, *d*) the cleft thus being in sapwood, instead of through the heartwood and pith. The scion is prepared as for ordinary cleft grafting, except that the sloping cuts are so made that but one scarf exposes the pith (Figs. *f*¹, *f*², *f*³). After the insertion of the scions the cut surfaces left exposed are thoroughly waxed, and the stock is well bound with cotton cloth to prevent it from opening and drying out."

Hickories and walnuts can be budded by the annular process (page 45), working upon one- or two-year-old seedlings, and probably with much less percentage of loss than by any

kind of grafting. Chestnuts may be grafted, however, in favorable seasons with a loss of not over twenty-five to fifty per cent, by the "cleft" process (pages 33 and 438). Two or three year old seedlings, or young sprouts, are most favorable subjects; put the graft in high up, so that the native stock shall form the trunk of the tree.

As soon as specific varieties are demanded nurserymen will have recourse to all these methods.

Native walnuts, pecans, and hickories do not bear much before they are fifteen or twenty years old. Chestnuts usually bear at about ten or twelve years; foreign varieties bear earlier, as do all budded and grafted trees, but then they are always shorter-lived. In the Southern States most nut trees will produce crops in five or six years.

CHESTNUTS.

NATIVE VARIETIES.

THE American Sweet Chestnut is the only one really entitled to be called sweet; it is much superior in flavor to both the European and Japanese kinds, though as yet it cannot approach



FIG. 573.—Murrell.



FIG. 574.—Native Chestnut.

either in size. Nevertheless, in only the few years it has begun to attract attention some wonderfully large nuts have been discovered. Chestnuts are so much easier to propagate than other nut trees, come into bearing so much earlier, and command such highly remunerative prices that their cultivation is not likely to be neglected much longer. The tree is indigenous all over the eastern United States, growing luxuriantly on rocky, gravelly hillsides. It does not do well on

limestone, or clayey soil, nor will it flourish in wet, boggy land. The young seedlings are characterized by their long tap-root, and therefore unless the nuts are planted where the trees are to grow they must be treated as described on page 435.

When chestnut groves are cut for the timber, sprouts or scions spring up with rank growth from the stumps. A fruit-



FIG. 575.—Wild (abundant yield).



FIG. 576.—Wild Chestnut.

ing orchard may be had earlier than from seedlings by cutting away the sprouts sufficiently to give ample room to those which are left to form good bushy heads, and budding or grafting those left. However, owing to the difficulties attending either of these operations, according to the Pennsylvania State College Agricultural Experiment Station but seventy-five per cent can be expected to be successful. It is better to graft all the strongest shoots and thin out, after it is found which have succeeded in making perfect unions and are growing vigorously.

STORING chestnuts either for market purposes or for home use requires attention as soon as the crop is gathered. Put them in any suitable tub and pour boiling water over them until the nuts are covered. Stir them with a stick to insure thorough scalding. The wormy ones will float and may be gathered off the surface. Allow the others to remain fifteen or twenty minutes, after which spread them out until perfectly dry. They may then be stored in bags or barrels until wanted, and will be found to keep much better than if not subjected to the scalding process. The meat will be less horny and hard.

In the chapter on chestnuts in the monograph on nut culture of the U. S. Department of Agriculture, some seventeen varieties are named, but as it is improbable that many of these are in the hands of dealers—being as yet only local—it is hardly worth reproducing them here.

Those who desire to obtain trees of native chestnuts must usually themselves search out those of exceptional merit.

FOREIGN VARIETIES.

French, Italian and Spanish chestnuts have long been imported in moderate quantities and sold at high prices in the

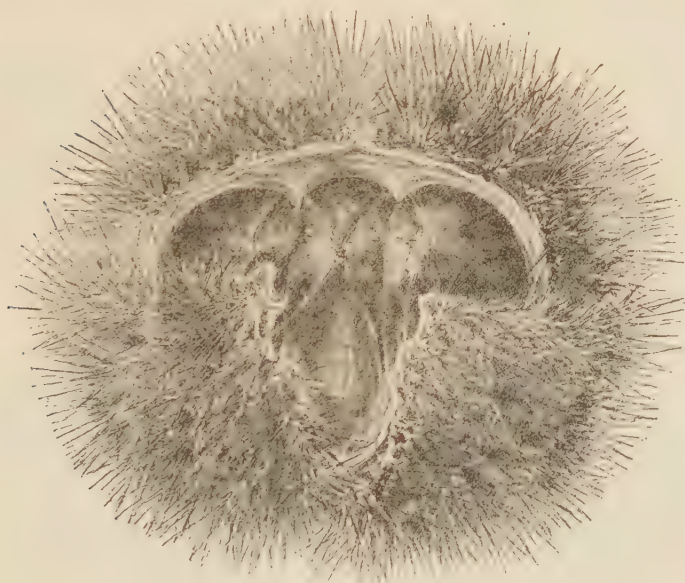


FIG. 577.—Tamba-guri (reduced one-half).

fruit stores. Abroad they are highly prized as an article of food and are largely consumed by all classes. They lack the sweetness of the American chestnut and the meat is enveloped in a tough and sometimes bitter skin. In some varieties this skin is readily removed, while in others it follows the convo-

lutions of the nut deep into its centre. The French, Spanish, and Italian chestnuts are of the same stock. The trees are strong growers, introduced originally into Europe from Asia Minor. The nuts vary considerably in size and in quality. They are usually large, oblate conical in shape, the scar small compared with that of the Japanese varieties, in which latter it sometimes covers nearly half the shell. These nuts are often not worth growing in the United States, the greater promise of the newly introduced Japanese varieties of chestnut (Guri) being much more attractive, although they have not as yet proved so hardy as their European congeners. The wild chestnuts of Japan annually produce large crops of nuts about an inch in diameter—the variety known as Tama-guri (Mountain Chestnut) being highly esteemed by the Japanese. The tree is some thirty feet high. The cultivated sorts are of many varieties, the largest of all being the Tamba-guri (Fig. 577). These trees grow thirty to sixty feet high.

All of these foreign chestnuts compensate in a measure for their inferior flavor to our native sorts, by their greater size and the earlier bearing of the trees. They are furthermore very prolific.

Grafting these great nuts upon American stocks will probably add to their hardiness and vigor.

VARIETIES.

Advance. Large, smooth, dark. Tree vigorous, productive, bears early. Ripens last of September. Japan.

Alpha.* Large. Tree vigorous, regular, and prolific bearer. Earliest to ripen. Japanese. Originated in New Jersey.

Bartram Late. Medium, bright color, three to a burr. Ripens middle of October. European. Originated in Pennsylvania.

Black. Large, dark color, productive. Ripens last of September. Japan. Originated in New Jersey.

Dager. Large. A seedling of Ridgeley. European. Origin Delaware.

Early Reliance. Medium, smooth, bright. Tree dwarf, spreading, bears early. Ripens last of September. Japan.

Eureka. Large, quality above average. Tree rapid grower, spreading habit. Not hardy North. European.

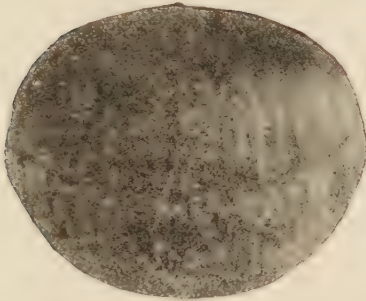


FIG. 578.—Japan Giant.



FIG. 579.—Numbo.

Felton. Large, sweet, good flavor. Japanese. Above average in quality. Origin, Delaware.

Hannum. Large, bright, regular and productive. Ripens early. European.

Kerr.* Dark, three to a burr. Tree enormously productive. Japanese. New Jersey.



FIG. 580.—Paragon.



FIG. 581.—Ridgeley.

Killen.* Very large, handsome, superior quality. Japanese. Delaware.

Mammoth Very large. A seedling of Giant. Japan.

Numbo. Medium, smooth, bright. Tree vigorous, hardy, regularly productive; good. Does not bear early. Fig. 579. European. Origin, Pennsylvania.

Paragon.* Large, sweet, good flavor. Tree bears young and abundantly. Fig. 580. European. Origin, Pennsylvania.

Parry. (Parry's Japan Giant.) Very large, smooth, dark-colored; one or two nuts only in a burr. Tree vigorous, upright grower. Fig. 578. Japan.

Parry Superb. Large, bright, smooth. Tree strong grower and enormously productive. Japan.

Ridgely.* (Dupont.) Medium, sweet flavor, excellent. Tree hardy. Fig. 581. European. Origin, Delaware.

Success. Large, handsome nut of good quality. Tree vigorous and productive. Japanese. Origin, New Jersey.

THE CHINQUAPIN

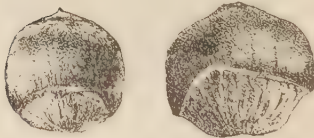
Is really a dwarf chestnut, which grows wild in various localities on the eastern seaboard from Pennsylvania to the Gulf. Usually a small spreading bush four to ten feet high, varieties are sometimes found which form trees from thirty to sixty feet in height. The nuts of the Eastern States are ovoid conical, dark mahogany color, very handsome, and the meat is sweet and good. The chinquapin of the Pacific coast nearly resembles in appearance a small chestnut. The bushes will thrive and appear entirely hardy as far north as New York.



FIG. 582.—Eastern Chinquapin.

HAZELNUTS.

The cultivation of this nut is almost wholly neglected in this country, and while the native bushes abound, the crop and the



FIGS. 583 and 584.—Native Forms of Hazelnuts.



FIG. 585.—“Istrian” (an imported nut).

nuts are usually so small that they rarely appear in market. The imported filbert has complete possession, and until some

method of overcoming the difficulty of its culture in the United States is discovered, we are likely to be dependent upon foreign growths for supplies of this nut.

The bushes are easy of cultivation and will often apparently flourish, but they fail to bear fruit and the bushes are liable to a disease which eventually kills them. The late Mr. N. S. Fuller had probably more experience in growing filberts than any other man in America, and his recent book on *Nut Culture* gives in detail his experiments and failures.

In the States west of the Rocky Mountains the hazel becomes a tree of fifty or sixty feet, and is said to bear large crops.

The following description of the propagation, etc., of the filbert is taken from "*Nut Culture in the United States*:"

"*Propagation*.—Propagation is effected by seed, by layers, by suckers, by cuttings, and by grafting or budding. Grown from suckers, trees come earliest into bearing, and by some are claimed to make the strongest trees; but the major portion of hazel trees produced in nurseries are from cuttings, made eight or ten inches in length, from last year's wood. They root as readily as gooseberries. A moist, not wet, sand supplies the best ground in which to root cuttings; a deeper setting is necessary in the drier climate of the United States than in England. In a year the cuttings become well rooted, and are then transplanted, after pruning, from the propagating-bed to the nursery row. The nursery culture consists of thorough and frequent stirring of the surface soil, and the training of each plant to tree form. The sprouts and branches are kept removed from about the base to a height of twelve inches (the Germans claim that a height of from three to four feet for the trunk is better); within the next six or eight inches the head is formed of not less than six branches. In the midst of these branches a barrel hoop is often placed, to which the limbs are tied for forming a shapely and open crown. The aim of the two or three years of nursery work is to grow the trees to six or eight feet in height and in form like a goblet, after which they are ready for planting.

"*In the Orchard*.—The hazel will not thrive in stiff clay, while in dry, sandy soil it becomes stunted and produces fruit of small size. Otherwise, the bush is not

particular as regards soil and locality; it is always more vigorous on rich land than on poor land. A light loam with dry subsoil will give the least wood and most nuts. A strong soil produces an excessive growth of wood at the expense of the crops. Wet soil produces too much wood and too little fruit. In Kent, England, the hazel thrives best in limestone land, and reaches a height of twelve feet, and occasionally of thirty feet. The trees are set in well-drained ground, about ten feet apart each way, though sometimes they are set in hedges, when a less distance in the row is adopted. Root pruning is frequently practised to prevent the too rapid growth of food. The disposition of the hazel to make thrifty inside cane growth is kept constantly in check by summer pruning, and the outer limbs, together with the general growth of the trees, are checked by pruning back in the latter part of the winter. The thin, unfruitful twigs are removed and the fruitful limbs are shortened back nearly to the female buds. Care is taken to leave sufficient male catkins for an ample supply of pollen. The fruit spurs are near the extremities of the last year's growth, and nuts are more abundant where air and light have ready access. In the fifth or sixth year after planting, trees should bear considerable fruit. Trees of this age in England are reported to produce from three to four pounds of nuts each. It is a very important orchard tree with many cultivators in Europe, and has been greatly improved by years of careful cultivation and selection. A very fruitful hazel orchard is reported in Wernfeld, Germany, occupying about two and a half acres of land and having a northwesterly slope. In that latitude the trees are said to thrive with any exposure except directly southern. They are recommended by Goeschke for clothing the steep sides of hills and mountains; also for railroad banks. He states that in Germany they are advantageously used in those portions of fruit orchards where other trees fail.

"Harvesting and Marketing.—It is a popular method in England to harvest and market finer nuts in their husks. In all cases the fruit is left on the bush or tree until fully ripe, the proper condition being readily determined by the brown color of the nut, the tint of the husk, and the readiness with which the nuts would rattle out by a slight jarring of the trees. In curing the nuts thus harvested,

they are placed for a few days in lofts to sufficiently dry, after which they are packed in sound casks with a slight sprinkling of salt throughout the filling. Salt is also used in small quantities in storing the nuts that have been freed from the husks, and it is claimed for this practice that freedom from ravages of insects is secured and that the nuts come out fresher and brighter than by other methods.

"Generally, the hazel is marketed for dessert purposes alone. though a pleasant oil, resembling olive oil, is sometimes ex-



FIG. 586.—Lambert Filbert.

pressed from it; and in portions of Europe this nut, like the chestnut, has been used in limited quantities for making bread."

VARIETIES.

The named varieties are numerous, but the grower having a half-dozen of the best can well afford to forego the planting of others. Of the ten varieties named by Robert Hogg,* the Cob and Lambert are the best known in reputation to Americans. We follow his description of the best varieties known to him:

Bond Nut. Husk hairy, shorter than the nut; nut of medium size, ovate and oblong; shell thin; kernel large. This is an excellent nut and the tree is a good bearer.

* "Fruit Manual," London, 1875.

Cob. (Round Cob.) Husk hairy, shorter than the nut and much frizzled; nut large, obtusely ovate; shell of a light brown color, rather thick; kernel large. A good nut for early use, but does not keep well. Fig. 587.

Cosford. (Miss Young's.) Thin shelled; husk hairy, long as the nut and deeply cut; nut large, oblong; shell of a light-brown



FIG. 587.—Downton Cob-nut.

color, very thin, so much so as to be easily broken between the finger and thumb; kernel large and well flavored. An excellent early nut, and the tree an abundant bearer.

Downton Square. Husk smooth, shorter than the nut; nut large, short, four-sided; shell thick, kernel full and well flavored.

Frizzled Filbert. (Frizzled nut, Cape nut.) Husk hairy, twice as long as the nut; deeply frizzled and spreading open at the mouth; nut small, oblong, and flattened; shell thick, kernel full. This is a rather late variety. The tree is an excellent bearer. The nuts are produced in clusters.

Lambert. (Kentish Cob, Filbert Cob.) Husk nearly smooth, longer than the nut, and very slightly cut around the margin; nut large, oblong, and somewhat compressed; shell rather thick, of a brown color; kernel full and very rich flavor. This is, per-

haps, the best of all filberts. The tree is a most abundant bearer. Some of the nuts are upward of an inch in length, and they have, with care, been kept for four years. It is only after being kept for some time that their full richness of flavor is obtained. Mr. Hogg says this nut was first brought to the notice of the Horticultural Society by A. B. Lambert about the year 1812. It is improperly called Kentish Cob. The true Cobs are roundish, thick-shelled nuts. Fig. 586.

Pearson. (Dwarf Prolific, Nottingham Prolific.) Husk hairy, shorter than the nut; nut medium in size, smaller than the Cob, obtusely ovate; shell rather thick; kernel full. A very excellent variety. Trees are most abundant bearers, sometimes laden with fruit when not more than $2\frac{1}{2}$ feet high.

Purple Filbert. (Purple leaved.) This differs from the red filbert in having the leaves of a dark, blood-red color like those of the purple beech. The fruit is similar to, and quite as good as that of the Red Filbert, and is of a deep purple color.

Red Filbert. (Red Hazel.) Husk hairy, longer than the nut; nut of medium size, ovate; shell thick, kernel full, covered with a red skin.

White Filbert. (Wrotham Park.) Husk hairy, longer than the nut, around the apex of which it is contracted; nut medium size, ovate; shell thick; kernel full, covered with a white skin.

HICKORIES.

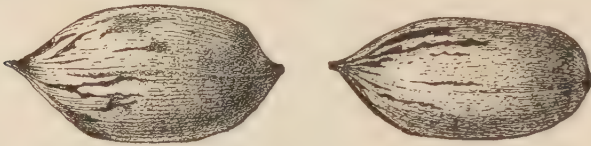
Pecans (Hicoria Pecan).

It is commonly supposed that the pecan is hardy only in the Southern States, and few attempts have been made to grow it in the North. It flourishes best in Texas, the Gulf States, and Mexico. Probably the greatest quantity sent to market comes from Texas or Louisiana, where the tree grows to sixty or seventy feet high in the rich alluvial bottom-lands and annually produces large crops of nuts, which find a ready market at very remunerative prices. The thinness of the shell, its bright glossy surface, often artificially polished for market, but above all the full, tender, rich kernel, combine to make this member of the hickory family the popular nut-tree after the chestnut grown in America. West of the Alleghanies the pecan has been found growing wild and yielding good nuts as far north as Southern Iowa. Forty miles north of New York there are some very large old trees, which are evidently hardy enough, but they have never been known to produce nuts.

The tree as grown in the South much resembles the common hickory, grows to about thirty feet high in fifteen years, and bears at ten or twelve years of age.

Pecans are usually propagated from seed, but the results are so unreliable that grafting or budding must take place as the only certain way of obtaining valuable sorts.

The remarks made in the introduction to this chapter concerning the difficulties of transplanting nut-trees apply with



FIGS. 588 and 589.—Common Forms of Pecan.

intensified force to the pecan, whose tap-root is, in one and two year seedlings, three times as long as the shoot above ground. They must be treated as suggested for other nut-seedlings—the ground must be rich and deeply cultivated.

If raised from seed, plant the nuts in drills three or four feet apart, and twelve or fifteen inches apart in the drills.

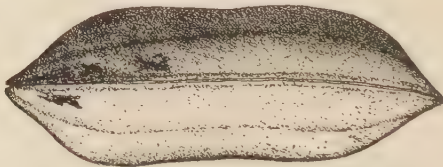


FIG. 590.—Centennial.

In the early spring following, the young trees should be about two feet high; take them up carefully, to preserve all the fibrous roots possible, cut off about one-half the tap-root, and reset immediately. Two years after, again take up and plant permanently, or, preferably, make the permanent planting at the end of the second year. Six or seven years subsequently, the trees should begin to bear, and as it is a rapid grower it is said that at fifteen years of age it will produce from two and a half to three bushels of nuts. Grafted or budded trees al-

ways produce fruit earlier. For directions concerning grafting, see general directions elsewhere in this book.

There has been too little attention given to the commercial growing of pecan trees to enable one to procure any definite sorts from nurserymen. The varieties here enumerated have generally been named by their discoverers or propagators,



FIG. 591.—Frotscher.



FIG. 592.—Idlewild.

and are mostly taken from their reports to the United States Pomologist. Correspondence with these parties is suggested to those who wish to obtain the choicest kinds thus far known.

VARIETIES OF PECANS.

Biloxi. (Mrs. W. R. Stuart, Ocean Springs, Miss.) Medium size, cylindrical, pointed at each end; surface quite regular, light brown; shell thin; cracking qualities medium; kernel plump, with yellow-

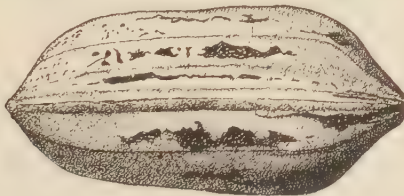


FIG. 593.—Jewett.

ish-brown surface; free from astringency, of good quality, and keeps well without becoming rancid. Introduced several years ago by the late W. R. Stuart as Mexican Paper-Shell, but the name has since been changed to Biloxi.

Centennial. A very large oblong nut; thickness of shell medium; partition walls rather thick; kernel plump, oily, good. Richard Frotscher, New Orleans, La. Fig. 590.

Columbian.* (Mrs. W. R. Stuart, Ocean Springs, Miss.) Large, cylindrical, somewhat compressed at the middle, rounding at the base; pointed and somewhat four-sided at the crown; shell rather



FIG. 594.—Jumbo.

heavy; cracking qualities medium; quality good. In size and form this nut closely resembles Mammoth, which was introduced in 1890 by Richard Frotscher, of New Orleans, La.

Faust. A long slender nut, good. D. D. Faust, Bamburg, S. C.
Frotscher.* Large; very thin shell; kernel oily, good. Richard Frotscher, New Orleans, La. Fig. 591.



FIG. 595.—McCallister.

Gonzales. (I. V. Munson, Denison, Tex.) Above medium size, with firm, clean shell; quality excellent. Originated in Gonzalez County, Tex.

Idlewild. Medium size, thick shell, kernel good. Louis Biediger, Idlewild, Tex. Fig. 592.

Jewett. Very large, irregular oblong, compressed near centre; shell rather thick; corky inner growth large; kernel oily, good. The late W. R. Stuart, Ocean Springs, Miss. Fig. 593.

Jumbo. Large, ovoid; thin shell, much corky partition; quality very good. F. M. Ramsay, Bluffton, Tex. Fig. 594.

McCallister. (Floyd.) The largest pecan known, supposed to be a hybrid of shellbark; base broad, rounded; apex broad, blunt, angular; flavor very like a shellbark; not very valuable except for possibilities of improvement. O. L. McCallister, Mt. Vernon, Ind. Fig. 595.



FIG. 596.—Risien.



FIG. 597.—Stuart.

Pearl. Medium size, thin shell, sweet kernel; no corky growth inside. A choice nut for family use, but said to be too small for market. E. E. Risien, San Saba, Tex.

Ribera. Size above medium; oblong ovate; cracking qualities good; shell thin; kernel plump, light brown, free from the bitter, red, corky growth which adheres to the shell; meat yellow, tender, with rich, delicate, pleasant flavor.



FIG. 598.—Van Deman.

Risien. Large ovate; quality excellent. E. E. Risien, San Saba, Tex. Fig. 596.

San Saba. Medium, cylindrical; kernel plump, light yellow, sweet and rich. E. E. Risien, San Saba, Tex.

Stuart.* Large, roundish, ovoid; thin shell; considerable corky growth in partitions; kernel plump; quality good. Late W. R. Stuart, Ocean Springs, Miss. Fig. 597.

Van Deman.* Large, oblong; thin shell; considerable corky growth; kernel not so plump as Stuart; flavor excellent. Mrs. W. R. Stuart, Mississippi. Fig. 598.

Shellbark Hickories.

Of the several varieties of ordinarily so-called hickories found growing wild in the United States—as the shellbark (*Hicoria laciniosa*), shagbark (*Hicoria ovata*), mocker-nut (*Hicoria alba*), pignut (*Hicoria glabra*) bitter-nut (*Hicoria minima*) water hickory (*Hicoria aquatica*), and nutmeg-hickory (*Hicoria myristicæformis*)—the first only has qualities which commend themselves for cultivation. As this work is intended



FIG. 599.—Typical Thin-shell Shellbark.



FIG. 600.—Oval.

to be strictly practical, only the shellbark hickory will therefore be treated of.

Perhaps but one variety of this nut has been subjected to cultivation and offered for sale (Hale's Paper-Shell). All others are the product of wild trees. And yet the differences in the sizes of the nuts, the thickness of the shell, the qualities of the kernels, the cracking peculiarities, and the freeness with which the meats may be extracted are very marked.

While size undoubtedly has a large influence in the selling of nuts, it is well known to all who have had any intelligent experience that comparatively small nuts have frequently disproportionately large and extremely high-flavored kernels.

The slow growth of the shellbark has and will have a deterrent effect upon its cultivation, and while a wild two-year-old will often be found four to five feet high, a trans-

planted tree three or four years old seems to make almost no growth for a year or two.

The late A. S. Fuller says he never knew an instance of successful budding of the hickory, while others claim that ring budding (see page 45) is moderately so.

Of the methods of grafting, the cleft (see pages 33 and 435) is said to give the best results, cutting the young trees close to the ground, inserting the scion, waxing thoroughly, and covering to its top with earth.

The nuts germinate easily, but, however valuable those planted, seedlings are nearly always inferior in every way to



FIG. 601.—Quadrangular.



FIG. 602.—Long Ovate, Compressed.

the originals. For stocks, nevertheless, upon which to graft scions from wild trees which are found to produce nuts of exceptional merit, they are well worth planting. If taken up from the nursery rows annually and the tap-root shortened in for two or three years, then planted out where the tree is to remain permanently, growing for one year and then cleft-grafted, every requisite for success at present known will have been complied with. If wild trees are dug for the purpose of grafting, those not over two or three years old should be taken, the chances of living of older and larger ones being too uncertain to make such experiments worth the trouble and cost.

The reports of the United States Pomologist give a list of a dozen or so of varieties which have been named by those who have found or own the wild trees upon which they grew. But it is so uncertain that any of these can be had by the

intending purchaser, that no list of varieties would be of much value at this time.

Illustrations are given of various shellbarks collected by the editor, or sent to the Department of Agriculture from different parts of the country, to show the variety in shape and appear-



FIG. 603.—Roundish, Compressed.



FIG. 604.—Roundish, Oblique.

ance of wild nuts. Probably the number might be largely increased. Fig. 599 represents the typical form of the thin-shelled shellbark; any very wide departure from this shape, as Figs. 600 to 604 inclusive, usually indicates thicker shells and correspondingly smaller kernels.

WALNUTS.

The name walnut is rather indiscriminately used in this country, being perhaps most frequently applied to hickory-nuts (white walnuts, so called), and after them to the Persian or Madeira nut. Two valuable members of this family are indigenous to America, whose nuts are highly appreciated and much used, the butternut (*Juglans cinerea*) and the black walnut (*Juglans nigra*). The value of the timber of both these trees is well known, and alone should offer sufficient inducement for their cultivation. So great, indeed, has been the demand for the latter that there has seemed danger it would become exterminated wherever within profitable reach of a shipping-point, and the use of the former is rapidly increas-

ing, with a probability of the same reckless cutting that has befallen the black walnut. While possibly it may not pay in a pecuniary way to propagate either of these trees for their nuts alone, together with the value of the timber, constantly increasing in price, it offers an opportunity to those having land adapted to their growth.

The Butternut

is considered by many the best of all native nuts. The meat is tender, crisp, oily, and highly flavored. The thick-

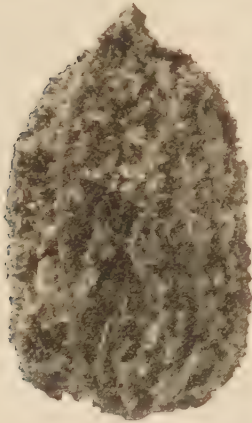


FIG. 605.—Typical Butternut.

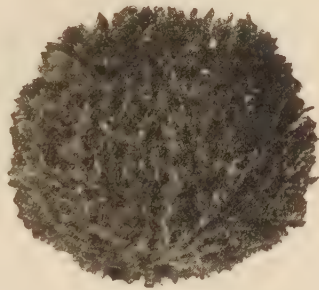


FIG. 606.—Typical Black Walnut.

ness and sharply ridged and furrowed character of the hard shell is a drawback to its use; nevertheless, the richness of the kernel makes them well worth adding to the varieties of nuts for home use.

There are no named varieties in the hands of nurserymen, who supply orders with seedlings usually from trees in their neighborhood or from nuts purchased by them. As usually the case, however, there are considerable differences in size and shape of nuts found growing wild in different sections of the country. Fig. 605 is a typical illustration.

Those who wish to grow either the butternut or the walnut will do best to select the nuts which please them and raise their own seedlings.

The Black Walnut

is a large, round, hard-shell, deeply furrowed nut, with a rich, oily kernel. While much appreciated by most, its flavor is so pronounced as to make it unpleasant to others. Large quantities are used by confectioners and others, and its sale is of considerable value to those who are fortunate enough to own a number of trees.

It is found growing all over the United States, making a



FIG. 607.—Black Walnut (Taylor).



FIG. 608.—Peanut-shaped
Black Walnut.

tree from forty to sixty feet high. It has a more open spreading head than the hickory, and is more rapid in its growth. The nuts from different trees and sections vary considerably in size and depth of the furrows. The photo-engraving is an average specimen, while the other illustrations of this nut show variations.

PERSIAN WALNUT.

(*English Walnut, Madeira Nut.*)

The varieties of this nut, together with the hickories, belong to the order *Juglandæ*, and, while the genus was first known in the Old World, the greater number of species are indigenous to North America. In England this nut is known

simply as the walnut, while in the United States it is commonly called English walnut or Madeira-nut. The varieties which have been introduced, chiefly from France, are quite numerous. They have all been the product of selected seedlings or careful hybridizing. Recently Eastern Asia and Japan have added to the number, and the illustrations here given show that the grower has quite a scope for his taste and fancy.

The trees will endure a considerable degree of cold, but from experience over the greater part of the United States it has been noted that it does not succeed in the Middle States, nor westward to the Rocky Mountains. They are hardy near the coast line as far north as latitude 40° , and do well southward as far as Northern Georgia. It is sometimes the case that the trees flourish but produce no fruit, or the nuts contain no kernels. The consensus of opinion among those who have propagated this nut appears to be that it really succeeds as a crop-producer in comparatively few places in the United States east of California.

In England and on the Continent the trees are said to be practically free from diseases. In the United States a minute worm (*Anguillula*), which infests the soil, particularly of the Gulf States, gets into the young roots and causes the root-knit which is such a destructive pest in these States.

Propagation.—All of the walnuts may be readily raised from seed. The nuts should be kept through the winter, and planted in the early spring as directed on page 437. In good soil and under favorable conditions they will sprout and grow two to three feet high the first season. The care of the seedlings is the same as stated in the general directions at the beginning of this chapter. As a rule, no pruning is required by these trees; they usually begin to bear at ten to fifteen years. The Japanese varieties are said to produce nuts at a much earlier age, say five to six years, and grafted trees at three to five years.

VARIETIES.

So few of the different named varieties of walnuts can be had from nurserymen that the following brief descriptions and illustrations are given, chiefly as matters of interest in this con-

nection. Where it is believed that any variety can be purchased, an asterisk follows the name.

The smallest cultivated nut is *Juglans regia microcarpa* (Fig. 609). The shell is thick, the kernel correspondingly small. The largest walnut is *Juglans regia gibbosa* (Fig. 610). The shell is thick, hard, and roughly corrugated, and the kernel quite small for so large a nut; the flavor is said to be good. *Juglans intermedia pyriformis* is claimed to be a hybrid of the Persian walnut and the black walnut. The fruit, as the name indicates, is pear-shaped. The nut has the hard, thick shell of the black

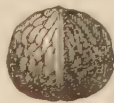


FIG. 609.—*Juglans Regia Microcarpa.*

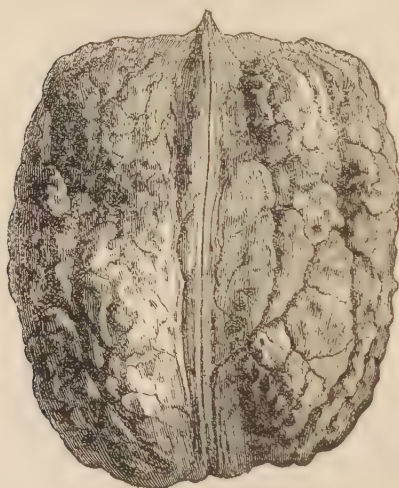


FIG. 610.—*Juglans Regia Gibbosa.*



FIG. 611.—*Juglans Regia Barthièveana.*

walnut and its consequent limitation of space for the kernel, but it is said to split readily and the meat to leave the shell freely. A peculiar form of the walnut is shown in Fig. 611, *Juglans regia Barthièveana*, which its originator, M. Barthiève, of Toulon, France, says is of exceptional merit—thin shell, splitting easily; kernels full, rich; very prolific and bearing early from seed. The following are varieties of the Persian walnut:

Chalbert. Medium, oval, oily, good, productive; blooms late. Fig. 615.

Franquette.* Large, oval, rich, excellent table sort. France. Fig. 619.

Kaghagi. Large, handsome nut; meat fills the shell; high flavor; claimed to be the hardiest of the Persian walnuts.



FIG. 612.—*Juglans Cordiformis*.

Mayette.* Large, oblong, oily, good; nuts grow in pairs; shell hard; blooms late. Suited for frosty places. France. Fig. 620.

Parisienne. Large, oblong, excellent; good table nut. Fig. 616.

Præparturiens.* A famous French variety, introduced into California in 1871, now widely distributed. Its chief merits are early bearing and high quality. Fig. 617.

St. Jean. Medium, roundish; hard shell; meat oily. Cultivated chiefly for its oil. Fig. 618.

Asian and Japanese.

Cordiformis.* Small, heart-shaped; thick, hard shell. Hardy and productive as far north as New York. It will be of commercial value, especially for confectioners' use, as soon as it becomes



FIG. 613.—*Juglans Sieboldiana*.



FIG. 614.—*Juglans Manchuria*.

known, on account of the ease with which the meat shells out entire, when cracked. Fig. 612.



FIG. 615.—Chabert.



FIG. 616.—Parisienne



FIG. 617.—Præparturiens.



FIG. 618.—St. Jean



FIG. 619.—Franquette.



FIG. 620.—Mayette.

Japan. (*Juglans Sieboldiana*.) Small, hard shell; sweet, rich kernel; grow in bunches of fifteen or twenty in an odd-looking husk. Tree hardy and vigorous grower; round head; ornamental. Fig. 580. Not grown commercially to any extent.

Juglans Manchuria. A large, thick, rough-shelled nut from Eastern Asia. The tree is vigorous, entirely hardy, and fairly productive. Much resembles the butternut in appearance. Fig. 614.

CHAPTER XXIX.

THE PEACH.

THE PEACH, when in perfection the most delicious fruit of our climate, succeeds in favorable localities, from Maine to the Gulf of Mexico. In the more northern regions, the ripening of the earlier varieties commences only a few weeks before the close of the summer months; in the extreme South, well-matured peaches are obtained nearly as early as cherries and strawberries at the North.

The trees are more tender and of shorter duration than most fruit trees of temperate climates. In some localities they bear only two or three good crops, and then decline or perish. On favorable soils they continue for twenty or thirty years. In Western New York trees have in rare instances borne fruit for forty or fifty years. In France, according to authentic testimony, peach-trees which have been annually and freely pruned have lived to an age of one hundred years; and there is no doubt that on favorable soils, and by a regular shortening-in pruning, most of our orchards would endure much longer than the ordinary period.

The most extensive peach-growing regions are in New Jersey, Delaware, Maryland, Georgia, Southern Illinois, Michigan, California, thousands of acres being occupied with the plantations of single proprietors. The northern portions of Ohio and Western New York, protected on the north by Lakes Erie and Ontario, and Western Michigan, afford a very favorable climate for this fruit. But throughout the country at large, the selection of proper localities would doubtless afford good and regular crops, even in districts where its culture is rarely attempted. The remarks on this subject in a previous chapter of this work are particularly commended to the attention of those who may attempt the peach culture in severe climates.

The destruction of the peach-crop is caused in very many cases by the intense cold of winter. Vernal frosts often cause serious damage, but perhaps less than commonly supposed. If the fruit-buds remain unswollen, they will endure very severe cold. But it often happens that we have a few days of mild or warm weather during winter. This is sufficient to swell them slightly, or to throw moisture enough into them to render them tender; and if the thermometer should

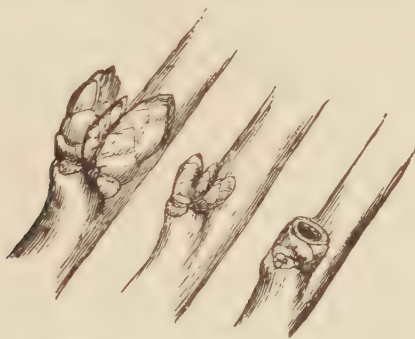


FIG. 621. FIG. 622. FIG. 623.
Peach Buds (Magnified Twice).

then sink several degrees below zero, there is scarcely a chance for their escape. Their condition may be soon ascertained by making a cross-cut with a knife through the fruit-buds. If destroyed, the centre will be dark brown; if uninjured, they will present the fresh greenish centre of sound buds. The accompanying figures represent the branches and buds of the peach magnified twice in diameter. Fig. 622 shows the two flower-buds, with the usual leaf-bud between, before they have become swollen by warm weather. Fig. 621 represents the appearance of the same after the occurrence of several warm days after midwinter. Fig. 623 exhibits the dark and dead interior of a flower-bud cut through its centre, after it has been killed by the frost. Under ordinary circumstances, the peach crop is destroyed when the thermometer sinks about 12° below zero (Fahr.); but when the buds have been much swollen, the crop has sometimes been cut off when only 5° or 6° below; while in rare instances unswollen buds under

favorable circumstances have passed uninjured through a temperature 20° below zero.

PROPAGATION OF THE TREES.

The peach-tree is of remarkably easy and rapid propagation. In rare instances, seedling trees have borne the second year, or sixteen months from the planting of the stone. Stocks may be budded the first summer, affording trees five or six feet high the second autumn. Transplanted the second year from the bud, the trees, with good cultivation, usually come into bearing about the third year afterward.

Some varieties reproduce the same from the stone with slight variation, but the only certain way to perpetuate delicious sorts is by budding. Grafting at the North rarely succeeds; at the South it is often successful. It often happens at the North that the severe frost of winter destroys the inserted buds, which die and drop off, leaving the attached portion of bark adhering fresh and green to the stock. This disaster, which so often disappoints the hopes of the young cultivator, is to be prevented by selecting buds from the largest and thriftiest shoots. These usually possess sufficient vigor to withstand severe frosts. The triple buds on the older and more matured portions of the shoots of bearing trees generally survive when the single buds above them perish, as may be at once perceived by examining the shoots of bearing trees late in spring.

When stocks are not budded till the second summer, it is very important to cut them down the previous spring, and suffer but one ascending sprout to grow, which will form a fine thrifty shoot for the reception of the bud.

In raising stocks, select the seed of hardy and late varieties. The stones are not injured if kept dry in a cellar till winter. If they become water-soaked for a length of time, they are spoiled. But soaking in water for a day or two and subsequent exposure to freezing facilitate the cracking of the stone. They may be kept through winter mixed with moist sand, and exposed to freezing and thawing, or placed in a moist cellar till near spring, then soaked in tubs or barrels, till the shells are well swollen with moisture. They are then placed in thin

layers on the surface of the ground, and exposed for two or three weeks to the action of the frost, being protected from drying by a covering of soil, leaf-mould, or muck. About the time the frost disappears from the ground, they are taken up and cracked by hand, placing the stone on the end of a wooden block, and striking a gentle blow on the side edge with a hammer. If well frozen, cracking may be unnecessary. They are then planted one or two inches deep (a light thin soil needing more depth than a heavy and moist one), and if they have been previously uninjured nearly every one will grow. Care is needed that the seeds do not become dried nor mouldy before planting.

When it is intended for them to come up evenly, as they are to remain in the nursery row, the most certain way to avoid vacancies or failures is to sprout them before planting. This is effected by mixing the kernels with sand and leaf-mould, and spreading them in a thin bed in the sun. When sprouted, a line or cord, permanently marked at equal distances of eight inches with a touch of paint, is stretched on the ground, and a sprouted kernel carefully inserted at every mark of the line, by means of a transplanting trowel. This insures great regularity in the rows. Accidental vacancies may be filled from a seed-bed when the plants are not more than two inches high. To prevent drying, the sprouted seeds should be kept covered with a flake of wet moss or a wet cloth, until deposited in the ground; and if the weather be dry, watering the ground may be requisite.

By planting the stones without cracking, a very small portion will grow and no regularity can be attained in the rows, unless the following mode is adopted, which, if the stones can be had fresh from the fruit before drying many days, and in large quantities, is perhaps the cheapest or attended with least labor. Mix the fresh stones with moist sand, spread them in a stratum about six inches thick over the ground, and cover them with a few inches of old straw or coarse manure to prevent drying. Remove this covering in winter, to expose them freely to freezing and thawing. In spring, a large portion will be found sprouting; carefully select these and plant them immediately in drills made with the hoe, covering them by drawing on earth with the hand. One man will thus

plant four or five thousand in a day. In a few days a second portion will be found sprouted, which plant as before; and so on, so long as the process continues. Those which do not open (often not more than one-third of the whole), will grow another year if kept moist and exposed.

If the soil is good, and the cultivator is passed between the rows as often as once a fortnight—oftener is better—the trees will be large enough to bud by the close of summer.

In cases where the ground cannot be prepared early for their reception, germination may be retarded by burying the uncracked stones a foot or two beneath the surface, till wanted.

The distances of the rows asunder should be about the same as for apples and other trees in the nursery, or about three and a half feet.

Plum-stocks for the peach slightly lessen their luxuriance of growth, render the trees smaller, thus slightly increasing their hardiness for the extreme North by favoring an early maturity of the young wood. It is, however, important to observe that this does not add to the hardiness of the fruit-buds. Small dwarfs are produced by budding on the *Mirabelle*, a diminutive variety of the plum. The plum-stock is also sometimes employed to guard against the peach-borer, a remedy often unsuccessful, as that insect frequently attacks the peach above the place of union. On the whole, the practice of working the peach on the plum is not regarded by fruit-culturists with much favor.

Unlike most other fruit trees, the peach may be transplanted in the spring next after the insertion of the bud, with scarcely a check in its growth.

Soils.—It may be observed, as a general rule, that soils affording good farm crops, and with a well-drained subsoil, are well adapted to peach-orchards. On a strong loam, the trees grow with more uniform luxuriance and live longer than on light, sandy, or gravelly soils. Even a compact clay may be made suitable for the peach by regular and thorough underdraining and mellow cultivation. On the light sands of New Jersey and Delaware orchards succeed and bear well for a time, but they do not endure so long as where the soil has a considerable admixture of heavier ingredients.

In transplanting for an orchard, the practice of *shortening-in* the shoots, described in the chapter on transplanting, should be invariably attended to, as it is of the greatest importance for the safe removal of peach-trees. Trees two years from the bud were formerly recommended, but only yearlings are now bought by good growers. Twenty feet apart is the common distance for orchards; but as better crops and better fruit is obtained where the heads are kept well shortened-in, and consequently within less compass, a distance of twelve or fifteen feet only will be found sufficient.

While the trees are small, the intermediate spaces between the rows may be cultivated with low-hoed crops; but afterward it will be found best to keep the ground perfectly clean and mellow by ploughing and harrowing. Where soils are very shallow, top-dressing with manure in autumn and frequent harrowing have been found best; the roots being thus brought near the surface, deep ploughing proves injurious. But where soils are deep and fertile, ploughing may be occasionally resorted to without injury.

The principle on which rotation in crops is founded dictates that two crops of peach trees, whether in the nursery or orchard, should not be grown successively on the same piece of ground; diminished growth in nearly all instances being the result.

One of the best manures for the peach-tree is wood ashes, whether fresh or leached; hence all composts with this material are eminently beneficial to peach orchards. When applied alone, half a peck of fresh and half a bushel of leached ashes to each tree are suitable quantities, spread broadcast over the surface.

The mode of *pruning* and *shortening-in* the peach has been already described in a previous chapter.

Training the peach against walls and buildings, so essential to the successful culture of the peach in England, is rarely practised in this country. It would doubtless hasten the maturity of the crop; but the warm exposure would at the same time, unless the branches were purposely protected, render the crop more liable to destruction by frost. Espalier training has been found to give excellent fruit, in consequence of the

thorough pruning and full exposure adopted in the management of the trees. Figs. 624, 625, and 626 exhibit the fan training usually adopted in espalier and wall training, in its successive stages. The limits of this work do not admit full directions, but the following general rules may be observed as a guide and will apply to all other annual pruning of the peach: 1. The fruit being borne on the shoots of the preceding year, a good supply of annual bearing-shoots must be kept on all parts of the tree. 2. As the shoots, left unpruned, extend yearly in length, and become bare on the sides, it is necessary to cut them back, in order to keep up a supply of new shoots from their base. 3. Rub off or cut out all the



Fan Training of Peach-Trees.

shoots which spring up from the bases of shoots thus cut back, leaving only a few strong ones at regular distances, so as to admit sun and air to the leaves, which distance may be usually about six inches.

RAISING PEACHES IN POTS.

Peaches are raised in pots to secure uniform crops every year in an uncertain climate, to test new sorts, to produce early bearing, and to obtain a supply of peaches where the grounds are too small for planting an orchard. Two modes are adopted—one without fire heat, the crop maturing a little earlier than in common orchards; the other, where, by the use of fire heat, the fruit is obtained two or three months earlier than in open ground.

Among those who have most successfully adopted the first-named mode are Ellwanger & Barry, of Rochester. P. Barry has furnished the following statement of their management, written when the trees were three years of age and in successful bearing:

"We have now fruiting, in wooden boxes ten by ten inches, fifty-three varieties of peaches, eleven varieties of nectarines, and seven of apricots.

"Age, Potting, and Soil.—The trees are now three years from the bud. They were taken up in the fall of 1861; heeled-in and covered during winter; potted early in spring—March, I think; soil a mixture of about three parts yellow sandy loam and one part of old hotbed manure.

"Summer Care.—After potting they were kept in a cool house, partly covered with glass, until they had made shoots four or five inches long and the danger of cold weather was over. They were then plunged to the rim of the boxes in an open border until the fall. They were carefully watered when necessary during summer, and the shoots kept as much as possible in uniform vigor by pinching.

"Pruning.—When potted, the yearling trees were cut back to six or eight inches, and in some cases to four inches, or only two or three buds above the union of bud and stock, the object being to grow them in the form of bushes. We now find that those cut back farthest are the best trees. [Fig. 627 represents the yearling tree; Fig. 628, the same cut back; Fig. 629, the tree set in a pot; and Fig. 630, the same after a year's growth.]

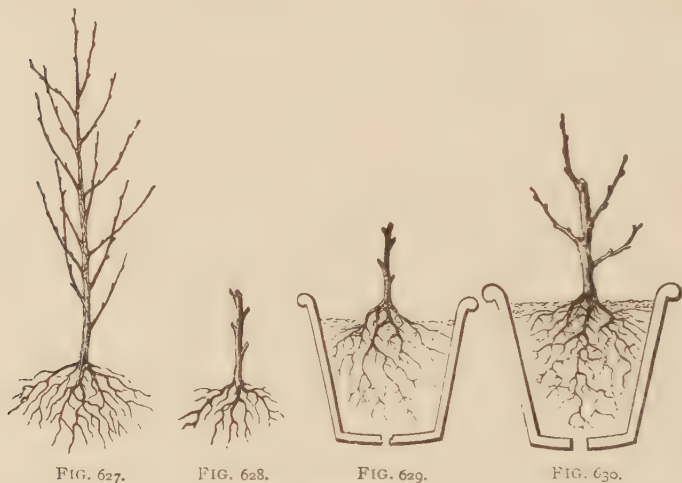
"Wintering.—On the approach of very cold weather, or just before the freezing of the ground so as to prevent outdoor work, they were removed to a shed, where they were plunged as they had been during summer, up to the edges of the tubs.

"Spring Treatment.—On the return of mild spring weather abundance of air was admitted, and they remained there till 1st of May, when they were placed under glass, the buds at this time being about to expand. Here they were kept till the 15th of June, at which time the fruits were set, and all danger of cold to affect the foliage past.

"Ventilation and Watering.—During the period they were under glass, May 1st to June 15th, the principal points of management were ventilation, which was ample, and watering—the latter being one of the most important points in the treatment of all trees and plants in pots. Careless watering will ruin any plants, no matter how skilfully or carefully

other points may be managed. Daily watering is necessary, and as soon as out of bloom a free use of the syringe night and morning.

Summer Treatment.—On the 15th of June, when all danger of cold was over and the fruits set, they were removed from the glass covering and plunged in an open but sheltered border, and mulched with old hotbed manure. Since that



Raising Peaches in Pots.

time they have received no care but watering, except an occasional pinch, to regulate the growth of shoots.

"There has not been a single leaf curled on any one of all these trees, showing conclusively that the curl is due to unfavorable changes of weather. Each tree now is a bush about two and a half feet high, and occupies about three feet square of space.

"The first winter we had potted trees we kept them in a cellar, but most of the buds dropped, and we changed to the cool dry shed, the boxes plunged, and this has been successful.

"The uncertainty of our climate now, as to the peach crop, compelled us to adopt this mode of testing varieties, and we are much pleased with the results thus far. As to the amount

of labor required, it would not be possible to state it with any degree of precision, as it is made up of odds and ends."

WINTER PROTECTION FOR THE TREES.

In the chapter on the Situation of Orchards, directions were given for the selection of sites for peach-orchards, to secure them against the destruction of the crop by the cold of winter. There are large districts throughout the more northern States where a selection of this kind cannot be made, and where the frequent and general failure of the crop indicates the necessity of some artificial protection. Various experiments for this purpose have been made, among which the following have so far proved most successful.

1. Training the young trees very low or near the ground, so that the branches may be bent down in winter, and covered with straw, corn-stalks, or, still better, with forest leaves or evergreen boughs. It is important that the branches should be laid upon the earth, that they may receive warmth from below, and the covering should be thick enough to exclude the cold air. Attempts to protect the fruit-buds by encasing them in non-conducting substances, without bending down, have generally proved failures. Covering with earth has been tried, but the moisture often rots the buds.

2. As the limbs of the peach soon become quite rigid, while the roots are more flexible, a more successful mode has been adopted: When the young trees are set out, the principal roots are extended in opposite directions and the others are kept cut off. This enables the tree, when the earth is partially dug away, to turn as on an axle by a slight twisting of the roots, so that it may be easily laid upon the ground. If trained flat or fan-shaped, it is easily covered.

3. A third mode has been successfully adopted in some of the western States. The trees are planted in a row and the branches trained horizontally in opposite directions. Posts are set between the trees four or five feet high, and the tops connected by strong horizontal poles. On the approach of winter, rafters are placed on each side against these poles, so as to form a rather steep roof. The outer limbs may be bent under the rafters if necessary. The whole is then cov-

ered with rough or cheap boards, and with two or three inches of earth. At the approach of warm weather in spring, the covering is partly removed to admit air and prevent the rotting of the buds, and the whole is taken off as soon as there is no danger from frost. The use of corn fodder laid on the rafters about two feet thick would be easier, and would probably answer an excellent purpose.

The earliest and hardiest sorts should be selected for these experiments, among which may be named Cooledge's Favorite, Hale, Early York, Cole Red, and Barnard.

VARIETIES.

While the pear and apple are chiefly affected by the influence of soil, the variations in the quality of the peach result mostly from the effects of climate. Fine American varieties are pronounced worthless in England. In this country, some, often delicious, are of little value in unfavorable seasons. Some which succeed finely as far south as Philadelphia lose much by removal to Western New York, from the slightly diminished warmth of the summers.

A large number of seedlings of high quality have been produced in this country, but as they vary but slightly and do not excel other named and known sorts, it becomes desirable not to extend the present list, unless by those decidedly superior to existing first-rate varieties. The similarity in quality and the comparative shortness of the fruit season render a small selection sufficient for ordinary collections. Hence the main object of the following descriptive list is to define the characters of described or well-known sorts, and point out those most worthy of cultivation in our climate.

While the foregoing holds true with respect to the varieties more particularly described in the pages immediately following, a very large number selected from the more recent introductions has been added in the present edition to the list given in the descriptive index. It is not pretended, however, that even together the large number of varieties named embrace all that may be described or offered for sale by nurserymen, nor are included those which are more peculiarly adopted for cultivation in the Pacific States.

SYNOPSIS OF ARRANGEMENT.

The fruit of different varieties of the peach is marked with but few distinctive characters. A similarity in outline, texture, color, and flavor, more nearly than exists in the apple, pear, and some other kinds, renders it necessary to resort to other points of distinction. The peach presents characters for this purpose not found in other fruits.

1. The *Divisions* are founded on the adherence or separation of the flesh from the stone, distinguishing clingstones and freestones; or, more properly, on the firm or melting texture of the flesh, indicated by the terms *pavies* and *melters*.

2. The *Divisions* are subdivided into *Classes*, embracing *pale* or *light-colored* flesh and *deep yellow* flesh.

3. The *Sections* are founded on the *glands of the leaves*. Section I. comprehends those whose leaves



FIG. 631. FIG. 632. FIG. 633.
Glands of Peach Leaves.

are deeply and sharply serrate (or cut like saw-teeth), and having no glands (or gum-like minute knobs) at the base (Fig. 631). Section II. contains those whose leaves are crenate or serrulate (with shallower and more rounded teeth), and having *globose glands* (Fig. 632). Section III. includes all those whose leaves are crenate or serrulate, having *reniform* or kidney-shaped glands (Fig. 633). "The form of the glands," observes Lindley, "as well as their position, is perfectly distinct; they are fully developed in the month of May, and they continue to the last permanent in their character, and are not affected by cultivation. The globose glands are situated, one, two, or more on the foot-stalks, and one, two, or more on the *tips* or *points* of the serratures of the leaves. The reniform glands grow also on the foot-stalks of the leaves, but those on the leaves are placed *within the serrature*, connecting, as it were, the upper

and lower teeth of the serratures together; their leaves, when taken from a branch of a vigorous growth, have more glands than the leaves of the globose varieties. It will, however, sometimes happen that glands are not discernible on some of



FIG. 634.



FIG. 635.

Large and Small Flowers of the Peach.

the leaves. especially on those produced on weak branches; in this case, other branches must be sought for which do produce them."

4. The sections thus formed are each divided into two *subsections*; the first embracing those which have *large flowers*, as in Fig. 634; and the second including such as bear *small flowers*, Fig. 635. The sub-sections are in most cases distinctly marked; but a few doubtful intermediate flowers may be immediately referred to one or the other by the color of the petals, the smaller being reddish or pink, and the larger nearly white, or with light margins. In the following revision, the leaf characters of some varieties have not been studied.

DIVISION I.—FREESTONES OR MELTERS.

CLASS I. FLESH PALE OR LIGHT-COLORED.

Section I. Leaves serrated, without glands.

Belle de Vitry. (Admirable Tardive.) Size medium, approaching oblate; apex depressed, suture deep; skin nearly white, tinged and marbled with bright and dull red; flesh rather firm, red at the stone, juicy, and rich. Flowers small. Quite late, or last of September. This is quite distinct from the Late Admirable, which ripens two weeks earlier; and from the Early Admirable, often known by the name of Belle de Vitry, and which ripens six weeks earlier. Both of the latter have crenate leaves with globose glands.

Double Mountain. (Double Montagne.) Medium in size, roundish, narrow at apex; surface pale greenish-white, with a slight soft red cheek, marbled darker; flesh white to the stone, delicate; stone ovate and rugged. Flowers small. Ripens at the end of summer. French.

Early Anne. (Green Nutmeg.) Rather small, round; surface greenish-white, becoming nearly white, sometimes faintly tinged with red to the sun; flesh white to the stone, sweet, pleasant, with

a faint mingling of a vinous flavor. Stone light-colored, small, uncommonly smooth. Shoots with a light green cast. Very early. The tree at the North is very tender, and the young shoots are often winter-killed, which, with its slow growth and deficient productiveness, render it unprofitable for general cultivation. Flowers large, white. English, old.

Early Chelmsford. (Mammoth.) Large, roundish, suture clear round, deep on one side; white, with a bright red cheek, flesh white, juicy, melting, slightly vinous, excellent. End of August. Succeeds well North and South.

Early Tillotson.* Size medium; round, or nearly globular; thickly dotted with red on a nearly white ground in the shade, dark deep red in the sun; flesh whitish, red at the stone, to which the flesh partially adheres; juicy, rich, high flavored, more of a nutmeg and less of a vinous flavor than the Early York, and ripening about the same time or a few days earlier, or the early part and middle of August. Flowers small. Its time of maturity is often somewhat variable, even on the same tree. The young trees are of slow growth, and the leaves liable to mildew, from both of which it gradually recovers as the tree advances in size. Origin, Cayuga County, N. Y. Succeeds well and is very valuable at the South, where it ripens in June.

Early York.* (True Early York, Early York of Downing, Early Purple *erroneously*.) Size medium, roundish oval, suture slight; dotted with red on greenish-white in the shade, dark red to the sun; flesh very tender and full of juice, rich, with a faint mingling of acid. Quite early, or middle of August. Growth rather free for a serrate-leaved peach. Very productive and, from its earliness, of great value. Differs from the large Early York by its large flowers, cut leaves, oval fruit, and earlier maturity. Flowers large. English.

Emperor of Russia. (Cut-leaved, Serrated, Unique.) Fruit large, approaching oblate, one-half more swollen; surface rather downy, dull yellowish-white, with a dark red cheek; flesh yellowish-white, rather firm, rich, high flavored. Flowers small. End of summer. Although the flavor is first-rate, it is a poor grower and a poor bearer. Origin, New York.

Fulkerson. Medium, obtuse, roundish; suture extending half round, sides unequal; skin whitish, with a rich red cheek; flesh whitish, red at stone, juicy, rich, sweet. Last half of August. Ohio.

Gorgas. Rather large, roundish, apex pointed, skin yellowish-white, clouded with red to the sun, suture indistinct, cavity large; flesh whitish, stained at stone, juicy, rich, of excellent quality. Late in September. Philadelphia, Pa.

Malta. (Italian.) Rather large, roundish, slightly flattened, suture broad, shallow; surface pale, dull green, blotched and spotted with dull purple next the sun; flesh greenish, slightly red at the stone, very juicy, melting, rich, with an excellent sub-acid, vinous flavor. Ripens end of summer. A moderate bearer. Shoots slightly liable to mildew. A spurious sort, with globose glands and of inferior quality, has been generally disseminated in this country. Flowers large.

Mountain Rose.* Medium large, round; skin white with a dark red cheek; flesh entirely free, white, very juicy, sweet, best. Early to mid-season. One of the best early market or dessert varieties. Widely grown. New Jersey.

Noblesse. (Vanguard, Mellish's Favorite.) Large, round-oblong or oval, slightly narrower at apex, and terminated by a short acute point; skin pale green, clouded and shaded with light dull red to the sun; flesh pale greenish-white to stone, very juicy, with a very rich high flavor. Tree of rather slow growth and liable to mildew, the only drawback on the value of this excellent peach. Ripens end of summer and the beginning of autumn. English. Flowers large.

Red Rareripe. (Early Red Rareripe, Large Red.) Rather large, globular, broad, and depressed, suture broad and deep, passing nearly round the fruit; skin nearly white, with red dots in the shade, and a rich dark-red cheek in the sun; flesh whitish red at the stone, juicy, rich, and high flavored. Ripens during the last two weeks of summer. Flowers small. Resembles the Royal George, but superior in quality. Both are subject to mildew of the leaves.

Royal Charlotte. Rather large, approaching ovate, base slightly wider than apex, suture moderate; skin pale greenish-white, with a deep-red marbled cheek; flesh white, pale red at the stone, juicy, rich, fine. Flowers small. First of autumn.

Royal George. (Early Royal George.) Rather large, globular, broad and depressed, or inclining to oblate; suture deep at apex, passing two-thirds round the fruit; skin nearly white, thickly dotted with red, with a broad, deep, rich red, slightly marbled cheek, flesh whitish, very red at the stone, juicy, and rich. Ripens a week or two before the end of summer. Flowers small. A moderate bearer. Shoots liable to mildew.

Stevens Rareripe.* Large, round-ovate; skin yellowish white with a crimson cheek; flesh white, free, juicy, very good. Medium late. Considered a profitable market variety in the East. New Jersey.

Sweetwater. (Serrate-leaved.) Is a seedling of the Early Anne but twice its size, resembling it in general character; ripening a week later, and, being too tender at the North and a miserable bearer, it is of little value.

The Sweetwater of Downing has globose glands, and is a distinct fruit—which see.

Walburton Admirable. Large, roundish, greenish-white, dark-red in sun; flesh white, red at stone, juicy, sweet. Middle and last of September. English.

Section 11. Leaves crenate, with globose glands.

Alexander.* Medium, white, covered deep red; flesh white, firm, juicy, sweet; pit nearly free; flowers large. An extra early variety. Good market peach. Very difficult to distinguish from **Amsden**; has many synonyms. Illinois.

Amsden.* Size medium, roundish; shaded and mottled red; flesh melting juicy, very good in quality, adhering to the stone. Tree vigorous, glands globose, flowers large. One of the earliest peaches, ripe at the North the latter part of July, and the last of May in the Gulf States. The Alexander closely resembles the Amsden in every particular. There are several other new sorts ripening about the same time, and similar in character and quality.

Astor. Large, slightly oblate, apex slightly depressed, suture distinct; surface nearly white, with a deep red cheek, stone small; flesh very juicy, sweet, good. Flowers large. Ripens end of summer. Origin, New York.

Barrington. Large, roundish ovate, apex rather pointed, suture on one side, moderate; skin nearly white, with a deep red, marbled cheek; flesh slightly red at the stone, juicy, rich, and of high quality. Flowers large. Ripens early in autumn. Does not attain its full flavor north of New York City. English.

Bellegarde. (Galande, Smooth-leaved Royal George, *Violette Hative of some*, Red Magdalen *erroneously*.) Size medium or large, round, regular; suture shallow, deepest at apex, with a slight projecting point; skin nearly white, with a faint tinge of green, and a rich red cheek, often streaked darker; flesh slightly red at the stone, a little firm, melting, juicy, rich, and of fine flavor. Stone rather large. End of summer. French. Flowers small.

Carpenter's White. Very large, round; white, slightly greenish; flesh white to the stone, juicy, melting, rich, excellent. Middle of October, promises well for market. Vigorous and productive. New York City.

Champion.* Medium large, roundish; skin creamy white with a beautiful red cheek; very handsome; flesh firm, white, juicy; very good. Early to mid-season. Quite hardy. Excellent for market or dessert. Illinois.

Cole's Early Red. Size medium, roundish; suture small; skin mostly mottled with red, with dark red on the sunny side; flesh juicy, rich, with a pleasant and fine flavor, hardly first-rate in quality. Flowers small. Valuable for its great productiveness and early maturity, ripening nearly as early as the Early York. American.

Coolidge's Favorite.* Rather large or medium, roundish, largest on one side; suture distinct at apex; skin nearly clear white, mottled with red dots in the shade, and with a brilliant deep scarlet cheek in the sun; flesh very melting and juicy, with a rich, faintly acid flavor. Ripens about the middle of August. Home use only. Flowers small. Origin, Watertown, Mass.

Druid Hill. Very large, roundish, cavity rather narrow, suture slight, with a distinct but scarcely prominent point at apex; surface pale greenish-white, clouded with red toward the sun; flesh greenish-white, purple at the stone, juicy, with a rich, very good flavor; stone long and rather compressed, much furrowed. Flowers small. Ripens quite late, or latter part of September. Origin, Baltimore.

Early Admirable. (Admirable, Belle de Vitry *erroneously*.) Size

medium, nearly round, skin nearly white, with a red cheek; flesh red at the stone, juicy, rich, sweet, fine. Quite early, ripening immediately after Serrate Early York. Flowers large. French.

Favorite. Large, oblong, or oval; skin rather downy, much covered with red, very dark toward the sun; flesh red at the stone, a little firm, juicy, with a good, vinous, but not rich flavor. Flowers small. Hardy and very productive. Ripens medium or rather late, or about the second week of September. Glands of the leaves very small, obscure, or none. American.

Fay's Early Ann. A seedling from the old Early Ann, glandular, thrifty, hardy, very productive; fruit greenish-white, rather small, of good and agreeable flavor. Ripens with the Tillotson, and valuable for its earliness.

Fox's Seedling.* Medium, round, slightly compressed, cavity narrow; white, with a red cheek; juicy, sweet, good. Flowers small. Season late. New Jersey.

George the Fourth. Large, round, suture deep and broad, one-half slightly larger; skin nearly white in the shade, dotted red with a deep red cheek; flesh slightly red at the stone, melting, juicy, rich, excellent. Flowers small. Ripens at the end of summer. Branches rather more diverging than usual, leaves pale green, often glandless. Crops moderate, one cause of its excellence. Origin, New York.

Green Catherine. Large, round, pale green, with a red cheek; flesh bright red at the stone, tender, juicy, rather acid. Season rather late; does not ripen rich as far North as the forty-third degree of latitude. Flowers small.

Grosse Mignonne.* Large, roundish, slightly oblate, apex depressed, with a deep suture; skin tinged with greenish-yellow, mottled with red, and with a purplish red cheek; flesh reddened at the stone, juicy, with a very rich, high, and somewhat vinous flavor; stone small, very rough. Early, the last two weeks of August. Of French origin. Flowers large. The peach usually cultivated in this country under this name, although an excellent variety, is not the genuine Grosse Mignonne, but differs in its small flowers.

Haines' Early Red. Medium, round; flattened at apex, suture distinct; skin whitish, with a deep red cheek; flesh whitish, juicy, melting, sweet, excellent. Middle to end of August. Flowers small.

Hales' Early.* Medium, nearly round; skin mottled red, dark red cheek; flesh white, melting, juicy, and high flavored, semi-cling. Flowers large. Last of July and first of August. Tree vigorous, healthy, an abundant bearer, ripening ten days or two weeks before any other good variety.

Hastings Rareripe. Rather large, roundish, sometimes slightly flattened, skin yellowish-white, shaded purplish-red; juicy, excellent. Middle of September. Flowers small.

Jones Early. Medium, roundish, suture shallow, distinct; yellow

ish-white, with pale red; flesh slightly reddened at stone, juicy, rich, excellent. Twentieth of August. Staten Island, N. Y.

Large Early York.* (Early York, Honest John.) Large, roundish, inclining to oblate in fully grown specimens, nearly white in the shade, with red dots, and with a deep red cheek to the sun; flesh nearly white, fine-grained, very juicy, with mild, rich, excellent flavor. Flowers small. English.

The New York Rareripe * (a name which has been more or less applied to nearly all the early red peaches sent to New York market), or Livingston's New York Rareripe, is usually regarded as identical with the large Early York, but the late T. Hancock, of Burlington, considered them distinct, the New York Rareripe being rather superior, and ripening three days later.

Late Admirable. (La Royale, Bourdine, Têton de Venus, Judd's Melting, Motteux's, Late Purple *incorrectly*.) Quite large, roundish, inclining to oval, with a deep suture extending nearly round, and an acute swollen point at the apex; surface pale yellowish-green, with a pale red cheek, marbled with darker red; flesh greenish-white, red at the stone, juicy, delicate, flavor excellent. Flowers small. Season rather late. Of French origin.

Late Rareripe. Large, roundish oval, apex marked with a depressed suture and sunken point; skin rather downy, pale grayish-yellow, spotted and thickly marbled, deep dull red to the sun, and with fawn-colored specks; flesh white, deep red at the stone; juicy, with a very rich and high flavor. The fruit is distinguished by its peculiar *grayish* cast. Flowers small. Season, the first two weeks of autumn. American.

Moore Favorite. Large, roundish; white, with a blush; flesh white, rich, vinous. Stone small, free. Early in September. Massachusetts.

Morris Red. Large, roundish, apex slightly depressed, suture moderate, distinct; surface greenish-white, with a bright rich red cheek; flesh greenish-white, quite red at the stone, juicy, sweet, rich. Flowers small. Season, end of summer. Origin, Philadelphia. Differs from George IV. in its darker leaves, heavier crops, more even fruit, inferior flavor, and in ripening a few days later.

Morrisania Pound. (Hoffman's Pound.) Very large, nearly round, surface dull greenish-white, with a brownish-red cheek; flesh pale yellowish, juicy, tolerably rich. Late. Flowers small. Origin, New York.

Nivette.* Large, roundish, sometimes slightly oval, suture slight, apex but little depressed; surface light yellowish-green, with a faint red cheek; flesh pale green, varying from pink to deep red at the stone, juicy and melting, and with a very rich flavor. Season medium, immediately preceding or ripening nearly with Morris White, and one of the best of its season for the North. Flowers small. Of French origin.

Oldmixon Free.* Large, roundish, slightly oval, one side swollen; suture visible only at apex; cavity shallow; surface a pale yellowish

lowish-white, marbled with red, with a deep red cheek when fully exposed; flesh deep red at the stone, tender, rich, excellent. Season medium, or the first of autumn. Flower small. Succeeds well in all localities, and has few equals as a variety for the North, to succeed the early peaches.

President. Large, roundish oval, with little suture; skin very downy, yellowish-white, with a tinge of green, and a dull-red cheek; flesh nearly white, deep red at the stone, very juicy, and with a high flavor; stone rough, to which the flesh partially adheres. Flowers small. Ripens a little later than Morris White, or middle of September.

Scott's Early Red. Medium size, roundish, suture distinct, moderate; skin nearly white, mottled and covered with red; flesh very juicy, with a rich, fine flavor. Flowers small. Rather early, or end of summer. New Jersey.

Scott's Nectar. Large, roundish oblate; bright red on pale yellow; flesh white, sweet, excellent. Early in September.

Stetson's Seedling. Large, roundish, suture indistinct; crimson on greenish-white; flesh white, pink at the stone, juicy, rich, excellent. Last half of September. Massachusetts.

Stump.* Large, slightly oblong, red cheek; flesh white, with an excellent flavor; free from the stone. Flowers small. Ripens middle of September, just after Oldmixon Free, which it resembles in size, appearance, and flavor. Popular in the East. New York.

Sweetwater Early. (Downing.) Medium, roundish, suture slight; skin whitish, rarely with a faint blush; flesh white, slightly stained at stone; juicy, sweet, melting, agreeable. Ripens with Tillotson and Serrate Early York. Flowers large.

Troth's Early.* (Troth's Early Red.) Small, round, red; flesh white, red at stone, not of first quality, but esteemed as a valuable early market variety; freestone. Flowers small. Early in August. New Jersey.

Van Zandt. Size medium, roundish, one-half larger, suture slight; skin nearly white, with a beautifully dotted red cheek; flesh whitish, tinted with red at the stone; juicy, sweet, of fine pleasant flavor. First of autumn. Origin, Flushing, Long Island. Flowers small.

Walter's Early. Rather large, roundish; surface nearly white, with a rich red cheek; flesh whitish, touched with red at the stone; juicy, sweet, of fine flavor. Ripens the last week of summer. Flowers small. A native of New Jersey, and is a valuable peach at the North.

Ward's Late.* Large, not quite of the largest size, roundish; surface dull yellowish-white, with a red cheek, nearly the color of the Oldmixon Free, but not so clear nor bright; flesh nearly white, of excellent flavor. One of the finest late peaches of the Middle States. Flowers small.

Washington. (Washington Red Freestone.) Large, somewhat oblate, with a broad, deep suture passing nearly round; skin thin.

yellowish-white, with a deep crimson cheek; flesh nearly white, tender, juicy, sweet, rich. Stone small, to which the flesh slightly adheres. Rather late. Flowers small. Origin, New York.

White Imperial. Rather large, roundish, often slightly oblate, depressed at apex, suture moderate; surface pale yellowish-white, often with a faint tinge of green; slightly tinged and sometimes striped with light purple to the sun; flesh very juicy, delicate, sweet, excellent. Flowers small. A uniform moderate bearer, and a valuable peach at the North, but worthless in Virginia. Ripens rather early, or latter part of August. Origin, Cayuga County, N. Y.

Section III. Leaves with reniform glands.

Baldwin's Late. Large, oblong, pointed at apex; greenish white, with a slight red cheek; flesh firm, juicy, good. End of October, keeping well. Flowers small. Southern Alabama.

Baugh. Medium, roundish, slightly pointed, suture obscure; flesh yellowish-white, quite white at the stone; melting, juicy, with a sweet, pleasant flavor—free from the stone. First of October. Georgia.

Brevoort.* (Brevoort's Morris, Brevoort's Seedling Melter.) Medium or large, round, and slightly oblate, suture distinct, deep at apex; skin nearly white or with a faint dingy hue, with a bright-red cheek; flesh rather firm, slightly red at stone, rich, sweet and high flavored. Flowers small. First of autumn. Moderately and uniformly productive. Origin, New York.

Chancellor. (Late Chancellor, Noisette.) Large oval, suture distinct; skin nearly white, with a dark crimson cheek; flesh deep red at the stone, with a rich, vinous flavor, stone oblong. Flowers small. Late. Of French origin.

Columbus June. Medium to large, flattened at apex; skin pale yellowish-white, with a rich, red cheek; flesh slightly reddened at stone, melting, of excellent flavor. Flowers small. Georgia, where it ripens the twentieth of June.

Early Newington Free. Size medium, roundish, one-half always larger, suture distinct; surface nearly white, dotted and streaked with red, the cheek a rich red; flesh white, red at the stone, at first wholly adhering, but as it ripens partially separating from it, juicy, rich, fine. Flowers small. A valuable early variety, ripening immediately after the Early York.

Early Purple. (Purprée Hâtive, Pourprée Hâtive à Grandes Fleurs.) Size medium, globular, depressed, a deep suture across the apex; skin light yellow, with a mottled, purplish-red cheek; flesh red at the stone, melting, juicy, with a high flavor; stone broad and rough; season early, or middle or latter part of August. Flowers large. Rare in this country. The Early York has been propagated under this name in portions of this country, and the Grosse Mignonne in Europe; from both of which it differs in the glands of its leaves.

Henry Clay. Very large, deep purple in sun; flesh grayish-white, delicate, tender, peculiar flavor. First of August at the South, September at the North. Mississippi.

Jones Large Early. Large, roundish, flattened at ends, suture deep; skin white, shaded deep crimson; flesh white, pink at stone, juicy, rich, excellent. Middle of August. Staten Island, N. Y.

Kenrick. (Kenrick's Heath.) Very large, oblong, suture slight, apex pointed; surface pale greenish-white, with a purplish red cheek; flesh deep red at the stone, rather coarse, very juicy, sub-acid, often poor; when well grown in some localities, it proves a good sub-acid peach. Flowers small. Season medium, or rather late. New England. Valued for drying.

Lady Parham. Large, roundish, suture distinct, yellowish-white, downy; flesh pale, red at the stone, firm, with a rich, vinous flavor. October. Georgia.

La Grange. Large, oblong, surface pale greenish-white, rarely tinged with red by the sun; flesh juicy, with rich, fine flavor. Flowers small. Quite late. Origin, Burlington, N. J., and does not attain a fine flavor much farther North.

Montgomery's Late. Large, round, skin downy, yellowish-white, with a dull red cheek; flesh whitish, red at stone, juicy, melting, very good. September. Georgia.

Morris White.* (Morris' White Rareripe, White Rareripe, Lady Ann Steward.) Rather large, roundish, or roundish-oval, often obscurely obovate or a little larger toward the apex, suture small; surface rather downy, of a pale creamy white at maturity, rarely tinged with purple to the sun; flesh slightly firm, wholly white, very free from the drab stone, melting, juicy, with a good, rich flavor; hardly of the highest quality at the North, better in the Middle States; very popular everywhere. Season medium, or early in autumn. Good for home use.

Cole's White Melocoton, as usually cultivated, is a synonym; but when genuine, is quite distinct, according to the late T. Hancock, being larger, heavier, and rounder, and ripening two weeks later. Flowers small.

President Church. Large, roundish-oval, suture slight; pale red in shade, dark red in sun, handsome; flesh white, pale red at stone, very juicy, melting, and of delicious flavor. Middle of September. Georgia.

Scott's Magnate. Large, roundish-oblate; pale yellow, with a dark red cheek; flesh white, very good. Early in September.

Snow.* Large, globular, suture distinct only at apex; skin thin, wholly white; flesh white to the stone, free, juicy, sweet, rich. First of autumn. Flowers small. Very variable, sometimes worthless for the table. A beautiful peach for preserving.

Strawberry. (Rose.) Size medium, oval, cavity deep, suture passing half round; surface mostly marbled with deep red; flesh whitish, free, melting, rich, of fine flavor. Flowers small. Early. New Jersey.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves crenated, with globose glands.

Baltimore. (Baltimore Beauty.) Rather small, round-oval; skin deep orange, with a bright-red cheek; flesh yellow, red at the stone, sweet, good; mealy when over-ripe. Quite early. Flowers large. Origin, Baltimore, where it is good, but it proves of third-rate quality at the North.

Barnard.* (Early Barnard, Yellow Barnard.) Rather large, roundish, suture distinct, mostly covered with dark brownish-red; flesh deep yellow, red at stone, juicy, rich, very good. Tree hardy and a great bearer. Flowers small. This is a seedling of the Yellow Alberge, which it much exceeds in quality.

Brigdon.* (Garfield.) Medium, round-ovate; skin yellow, handsomely cheeked; flesh juicy, rich, very good. Mid-season. A popular market variety in Central New York. Of the Crawford type. New York.

Crawford's Early.* (Early Crawford, Crawford's Early Melocoton.) Very large, oblong-oval, sometimes round-oval; apex with a prominent point, suture shallow, surface yellow, with a red cheek; flesh very juicy, rich, slightly sub-acid, of good but not the highest flavor. End of summer and beginning of autumn. Productive. Flowers small. Ranks very high in the Northern, Middle, and Western States, as a market variety. Origin, New Jersey.

Crawford's Late.* (Crawford's Late Melocoton.) Very large roundish, suture shallow, distinct; surface yellow, with a broad, dark-red cheek; flesh red at the stone, rich, juicy, vinous, good. Quite late, or latter part of September. Flowers small. Origin, New Jersey. The common Red Cheek Melocoton is cultivated in some localities under this name. Often a poor bearer.

Crosby.* Tree prolific, exceptionally hardy; fruit medium, round, orange-yellow, splashed with red; flesh yellow, red at the pit juicy, rich. Mid-season. A popular market sort. Fruit apt to be small and inferior unless heavily thinned. Massachusetts.

Elberta.* Medium to above average size, round-oval, strongly sutured; lemon yellow, blush on sunny side; flesh pale yellow, tender, juicy. Tree vigorous, large leaves, hardy. A cross of Chinese Cling and Crawford Early. A good shipper. Can be gathered before it is ripe and will ripen up without rotting. Medium late. One of the best of the new varieties. Origin, Georgia.

Foster.* Very large, roundish, slightly flattened; skin yellow; flesh rich, juicy, quality very good to best. One of the finest varieties for general culture. Widely grown for market. Mid-season. Massachusetts.

Jaques. (Jaques' Rareripe.) Very large, roundish, slightly oblate, suture distinct, one side slightly larger, surface a little uneven; surface deep yellow, variously shaded with red; flesh deep yellow, red at the stone, of good but not of the highest flavor. Shoots diverging. Flowers small. Ripens at the end of summer. Origin, Massachusetts.

Lincoln. Large, roundish, suture large; skin downy, mostly dark purplish-red; flesh tinged with red at stone, juicy, excellent. Through September. Massachusetts.

Merriam. Very large, roundish-oval, with a bright red cheek; melting, juicy, sweet, rich. First of October.

Mrs. Poinsette. Large, globular; skin yellow, brown to the sun; flesh juicy, melting, rich, excellent. South Carolina, where it ripens early in August.

Muir.* A very large, yellow fleshed freestone of finest quality. Mid-season. It is highly valued on the Pacific coast for drying and for market. California.

Poole's Large Yellow. Large, roundish, suture half round; dark red on deep yellow; flesh yellow, red at stone, rich, juicy, very good. Last of September. Near Philadelphia, Pa.

Red Cheek Melocoton. Large, roundish oval, with a point at apex; surface yellow, with a deep red cheek; flesh red at the stone, juicy, with a good, rich, vinous flavor, not of first-rate quality. Ripens rather late, or during the last half of September; in the Middle States about the first of autumn. Flowers small. Formerly extensively cultivated as a market peach; now superseded by varieties of the Crawford type.

Reeves Favorite.* Large, roundish oval, pointed, with a fine red cheek; yellow flesh, melting, vinous, good. Middle of September. New Jersey. Excellent for home use.

Salway.* Large, roundish ovate. Yellow, with a crimson cheek; flesh deep yellow, red at the pit; sweet, juicy, good. Late. Valued as one of the best late peaches for market where it will ripen. England.

Scott Nonpareil. Large, roundish, slightly oblong; surface deep yellow with a red cheek, resembling Crawford's Late, but sweeter. Flowers small. Origin, Burlington, N. J., where it ripens about the 12th of September.

Tuft's Rareripe. Medium, roundish, with a bright-red cheek, melting, sweet, rich. Last half of September.

Yellow Alberge. (Purple Alberge, Yellow Rareripe *erroneously*.) Size medium, roundish, suture distinct, passing half round; skin yellow, with a deep purplish red cheek; flesh deep red at the stone, juicy, sweet, pleasant, of moderate flavor.

Yellow Admirable. (Abricotée, Admirable Jaune, Orange Peach, Apricot Peach.) Large, roundish oval, suture small, and on one side only, surface wholly yellow, or faintly reddened next the sun; flesh slightly red at the stone, firm, and rather dry; flavor sweet and agreeable, stone small; season very late. Flowers large. Of French origin. Adapted to the Middle States.

Yellow Rareripe. (Large Yellow Rareripe.) Large, roundish, suture a little sunken, extending more than half around, with a small point at apex; skin deep orange yellow, with a rich red cheek with faint streaks; flesh deep yellow, red at the stone, juicy, melting, with a very good vinous flavor. Stone small. End of August. Flowers small.

Yellow St. John.* Medium large, round; orange yellow with a red blush on sunny side; flesh tender, juicy, very good. Popular in many sections as an excellent yellow-fleshed freestone for the early market.

Section II. Leaves with reniform glands.

Bergen's Yellow.* Very large, round, slightly oblate; suture distinct, passing more than half round; surface deep orange, with a broad deep red cheek; flesh juicy, rich, excellent. Ripens the first of autumn. Flowers small. This is perhaps the finest of all yellow-fleshed peaches. Origin, Long Island, N. Y. It differs from the Yellow Rareripe in its more oblate form, darker color, superior flavor, and later maturity, and in its reniform glands. Tree of feeble growth.

Columbia. Large, roundish-oblate; suture distinct, passing half way round; skin rough, rather thick, dull dingy red, with spots of darker red; flesh yellow, rich, juicy, of excellent flavor. Origin, Georgia. Ripens early in autumn. Shoots dark reddish purple. Flowers small.

Hill's Chili.* Tree unusually productive; fruit medium large, oval, yellow and red; flesh rather dry, good. Season medium to late. Esteemed for market and for drying, especially in New York. It comes nearly true from seed and there are several sub-varieties. New York.

Smith Favorite. Large, roundish; suture deep, deep rich red on yellow; juicy, rich, very good. Last half of September. Valuable.

Smock Free.* (Beer's Smock.) Large, oval, base rather narrow; orange-red on yellow; flesh bright yellow, red at stone; moderately juicy and rich. Good drying variety. First of October. A standard late variety. New Jersey.

Susquehanna.* Very large, nearly round; skin rich yellow, with a red cheek; flesh sweet, juicy, rich, vinous, best. First to middle of September. Pennsylvania. Widely distributed and popular.

Triumph.* Medium to large, round, yellow and red; flesh deep yellow, semi-cling, juicy, very good. Ripens near Alexander. One of the best very early yellow-fleshed varieties. Popular in the South. Georgia.

DIVISION II.—CLINGSTONES OR PAVIES.

CLASS I. FLESH PALE OR LIGHT-COLORED.

Section I. Leaves serrated, without glands.

Old Newington. (Newington, Large Newington.) Large, roundish, suture slight; surface nearly white, with a fine red cheek, somewhat streaked with darker red; flesh nearly white, deep red at the stone; partly melting, juicy, rich. Season rather late, or middle of September. Flowers large. A sub-variety, cultivated to a considerable extent in this country, has *globose glands*.

Smith Newington. (Early Newington.) Size medium, roundish oval, narrower at apex, one side slightly enlarged; surface pale yellow, with a lively red cheek, streaked with purple; flesh bright red at the stone, juicy, good. Ripens end of summer. Flowers large.

This is of English origin, and is quite distinct from the Early Newington Freestone, a *melting* (not *firm-fleshed*) peach, often adhering to the stone.

Section II. Leaves crenate, with globose glands.

Large White Cling.* Large, round, sutures light, point at apex small; skin white, dotted with red, or with a light-red cheek next the sun; flesh very juicy, sweet, rich, and high-flavored. Season, early in autumn. Flowers small. Origin, New York.

Oldmixon Cling.* Large, roundish oval, suture distinct only at apex, fruit slightly larger on one side; surface yellowish-white, dotted with red, or with a red cheek; flesh juicy, rich, with a high flavor. Flowers small. Ripens first of autumn. This is one of the finest of clingstone peaches.

Section III. Leaves with reniform glands.

Catherine. (Catherine Cling.) Large, roundish oval, swollen most on one side, with a small point at apex; surface pale yellowish-green, thickly dotted and with a cheek of red, with darker streaks; flesh firm, dark red at the stone, juicy, rich, fine. Season late. Flowers small. Of English origin. The fruit of this variety and of the Old Newington and Oldmixon Cling considerably resemble each other, but all differ in the glands of the leaves.

Chinese Cling. Large, round-conic, suture shallow; fine red on yellowish white; flesh white, red at the stone, rich, vinous, good. Middle of September—middle of summer at the South. China.

Donahoo Cling. Very large, roundish, suture deep on one side; creamy white, tinged red in the sun; flesh white to the stone, juicy, rich, excellent. Georgia, where it ripens middle of September.

Hyslop. Large, roundish oval; crimson on white; juicy, rich, vinous. First of October.

Heath.* (Heath Cling, White Heath, White English, Eliza Thomas, Potters' September, Rany, White Globe.) Very large, oblong-oval, the largest specimens nearly round, with a large, conspicuous point at the apex; suture distinct on one side; surface quite downy, pale yellowish-white, sometimes faintly tinged with red next the sun; flesh exceedingly juicy, becoming melting, with a sweet, very high, rich, and excellent flavor; leaves large, wavy, deep green, slightly crenate. Flowers small. Season very late, about mid-autumn, and the fruit may be kept nearly till winter. At the North it matures fully in the warmest seasons only; and never attains its full size, which is about three inches in diameter, unless much thinned on the branches, to effect which a thorough shortening-in is the best mode. Origin, Maryland. Tree quite hardy and vigorous. In Southern Virginia, the Heath is rather an uncertain peach, but when perfect it ripens there the first fortnight in autumn. It is known also as Henrietta, but should not be confounded with a yellow peach of this name.

Pavie de Pompone. Very large, roundish-oval, suture distinct on one side; a deep red cheek on yellowish-white ground; flesh deep red at stone, juicy, sweet, good. Flowers large. First of October. French.

Rodman's Cling. (Red Cling.) Large, oblong; red next the sun; flesh whitish, firm, juicy. Last of September. Flowers small. American.

Shanghae. Large, oval, flattened, suture distinct, deepened at apex; skin greenish-yellow, shaded pale red; flesh greenish-yellow, melting, juicy, with a high, vinous flavor. First half of September.

CLASS II. FLESH DEEP YELLOW.

Section I. Leaves serrate, without glands.

Orange Cling.* Large, round, suture distinct, passing nearly round with a point at the apex; surface deep orange, with a dark-red cheek; flesh rather firm, rich, juicy, vinous. Season, early in autumn. Flowers small. Largely grown in California.

Section II. Leaves with reniform glands.

Blanton Cling. Large, oval, pointed; skin rich orange, with a slightly reddened cheek; flesh orange-yellow, firm, vinous, good.

Lemon Cling.* (Kennedy's Cling, Pine-Apple Cling, Yellow Pine-Apple.) Large, oblong-oval, slightly narrowed at apex, terminated by a large prominent point; surface deep yellow, with a dark brownish-red cheek; flesh firm, slightly red at the stone, with a rich, vinous, sub-acid flavor. Flowers small. Rather late. Tree productive, hardy. Origin, South Carolina.

Tippecanoe. Large, nearly round, slightly compressed; surface yellow, with a red cheek; flesh yellow, juicy, vinous, good. Quite late. Flowers small. A native of Philadelphia; of little value much farther North. New.

Washington Cling. Size medium, roundish; surface yellowish-green, with gray specks, and with a slight tinge of red to the sun; not handsome; flesh very tender, sweet, high-flavored. Flowers small. Quite late.

CLASS III. FLESH PURPLISH CRIMSON.

Section 1. Glands reniform.

Blood Cling.* (Claret Clingstone, Blood Cling.) Large, often very large, roundish-oval, suture distinct; skin quite downy, dark, dull, clouded, purplish-red; flesh deep red throughout, firm, juicy, valuable for culinary purposes. Very late. Flowers small. The French Blood Clingstone, the parent of the preceding, only differs from it in its smaller size and large flowers. The Blood Freestone is somewhat smaller and of less value.

CHAPTER XXX.

THE PEAR.

THE Pear, when grown to full perfection, is distinguished for its great delicacy, its melting and juicy texture, and its mild, rich, and delicious flavor. Excelling the apple in these particulars, it falls below it in importance in consequence of the less uniformly healthy habit of the tree.

PROPAGATION.

The best trees are raised from seedling stocks; suckers, unless unusually furnished with fibrous roots, are of crooked, one-sided, and stunted growth.

Raising the Seedlings.—The seeds, after separation from the fruit, should be kept as already described for apple-seeds, by mixing with sand or leaf-mould. The soil for the seed-bed should be unusually deep and fertile, rather damp than otherwise, and should have a good manuring with lime and ashes and an abundant supply of peat or muck, if the soil is not already largely furnished by nature with this ingredient.

The mode of sowing the seeds may be the same as that described for the apple, in drills from one to two feet apart. The more thinly they are sown, the less will be the danger of disaster from the leaf-blight; and for this reason, drills near together, with the seeds somewhat sparingly scattered in them, will be found best.

The leaf-blight is the most serious evil met with in the culture of pear-seedlings. It is more formidable in some seasons than in others. Commencing about midsummer, sometimes earlier, but more frequently later, it is first indicated by the leaves in certain parts of the seed-beds turning brown; in a few days they fall off; other portions of the beds are succes-

sively attacked, till all the seedlings become more or less denuded, those last affected occupying the most favorable portions of the soil. As a necessary consequence, growth immediately ceases; and if they are attacked early, and have made but little previous growth, they are nearly ruined, and few will survive the succeeding winter, for they never make a second growth the same year of any value. But if their previous growth has been vigorous, and the blight appears late in summer, much less injury is sustained. The best remedy is high cultivation, on good new soil, and taking out daily every diseased tree.

Wintering the Young Seedlings.—The frequent destruction of the trees the first winter is another serious evil. The danger is least with those that have made the best well-ripened growth; hence it becomes very important to secure healthful vigor by the adoption of the cultivation previously mentioned. But in many localities, pear seedlings, which are always remarkably free from fibrous or lateral roots the first year, are drawn out by the freezing of the soil, and either destroyed or greatly injured. Several modes have been proposed to prevent this result, and have been tried to a greater or less extent. One is to induce the emission of lateral roots, by taking up the young seedlings from the thickly sown beds early in the season, and, as soon as four leaves have appeared, cut off their tap-roots and reset them in the nursery-rows. Robert Nelson, of Newburyport, Mass., pursued this course with great success; but its general utility may be questioned, except during a rainy period or on favorable soils, unless abundant watering is given. A more easy as well as safe mode would perhaps be to cut off the tap-roots, at the same age, by means of a sharp spade thrust beneath the soil, and without transplanting. Neither of these modes could be successfully applied except to large, vigorous seedlings growing in deep, rich soil.

But where the growth of lateral roots has not been effected, and the consequent danger is greater of their being drawn upward by frost, much protection may be given them by covering the whole ground with forest leaves to a depth of several inches; and, if the rows are near each other and the trees several inches or a foot high, they will prevent the leaves from being swept off by the winds. The incursion of mice

may be avoided by placing the seed-beds as near as practicable to the middle of a clean ploughed field, and by encircling the ground with a bank or ridge of fresh earth thrown up for this purpose, about a foot high. Mice will not pass such a boundary under the snow.

Taking up the seedlings late in autumn, and burying them in a cellar, or laying them in by the roots and nearly covering the whole stems, will preserve them safely.

Budding may be performed the first summer after transplanting if the stocks have made a good growth. The management of the young trees is the same as for apples, by grafting or budding near the surface of the ground, and heading down, trimming, and cultivation. But as pear-stocks are valuable, budding is to be preferred to grafting, because it may be repeated in case of failure. Pear stocks are usually imported, since it is cheaper to import than to raise them. They come chiefly from France. Root-grafting is not employed.

DWARF PEARS.

For orchard culture, and in most parts of the country where the pear flourishes with great vigor and proves highly productive, pear-stocks will doubtless always be found preferable to all others. The advantages of a dwarf growth on dissimilar stocks have been already pointed out under the head of *stocks*. Such trees are not so long-lived as on pear-roots, and they require more thorough and fertile culture, and care in pruning. But they have some important advantages, such as coming soon into bearing, occupying a fifth part of the ground, thriving in many soils where pear-stocks will not, and in a few instances improving the quality of the fruit.

The only reliable stock is the French quince. Nearly all the experiments with the mountain ash have sooner or later proved failures. Budded or grafted upon apple seedlings, pears sometimes make a feeble growth for a few years; but unless the grafts themselves throw out roots, by planting beneath the surface, they sooner or later perish. It sometimes happens that grafts of a few varieties inserted at standard height grow and bear for a few years. The thorn has been used in England, and to some extent in this country, with

partial success. But all other kinds of dissimilar stocks have given way to the *quince*, which is much superior for general use to any other.

The varieties of the pear do not grow with equal facility upon the quince. A few, as the Angoulême, Louise Bonne, and Diel, are so much improved in quality that their cultivation on pear-stocks is discontinued by most fruit-growers. A large number flourish well, but are little changed in quality, as White Doyenné and Dearborn's Seedling. A few, on the other hand, succeed badly or wholly refuse to grow upon quince stocks, without *double working*, which consists in first budding some freely growing pear upon the quince bottom, and then budding or grafting the "refractory" sort into the pear-shoot.

As a general rule, double-worked trees do not flourish for a great length of time. Single-worked have done well for fifty or sixty years under favorable influences.

The following list, made out chiefly from the combined experience of European and American cultivators, may prove valuable to those commencing with dwarf pears:

I. Pears succeeding better on quince than on pear stocks, and which should be mostly worked as dwarfs.

Amalis.	Easter.
Angoulême.	Glout Morceau.
Autumn Long Green.	Louise Bonne.
Diel.	Vicar.

II. Pears usually succeeding well, both on pear and quince.

Alençon.	Colmar.
Anjou.	Dearborn's Seedling.
Bloodgood.	Delices Hardenpont.
Boussock.	Dumas.
Buffum.	Early Rousselet.
Cadette.	Figue.
Capiaumont.	Figue Alençon.
Catillac.	Forelle.
Chaumontelle.	Germain.

Gratioli.	Oswego.
Jaminette.	Poiteau.
Jargonelle.	Pound.
Jodoigne.	Real.
Kingsessing.	Rostiezer.
Laboureur.	Sterkmans.
Lamy.	Stevens.
Langelier.	St. Michel Archange.
Madeleine.	Superfine.
Malines.	Tyson.
Napoleon.	Urbaniste.
Orleans.	Van Mons Leon Le Clerc.
Osband	White Doyenné.

III. *Pears growing on quince but better on pear stocks.*

Aremberg.	•	Lucrative.
Bartlett.		Onondaga.
Été.		Seckel.
Gray Doyenné.		

IV. *Pears usually failing on quince, unless double-worked.*

Bosc.	Paradise
Dix.	Sheldon.
Dunmore.	Washington.
Gansel's Bergamot.	Winter Nelis.
Marie Louise.	

The result is not always the same in different soils and in different seasons. The Seckel, for instance, has wholly failed in one year, and in another, on the same spot of ground, has grown well. The White Doyenné grew finely one summer, and almost totally failed the next. Some sorts which in nearly all cases do well occasionally prove unsuccessful. A few uniformly, in all seasons and in all soils, make a rapid and vigorous growth, of which the Louise Bonne is perhaps the most striking example; some others, again, invariably fail (unless double-worked), the most prominent among which stands the Bosc. Indeed, so averse is this variety to a union

with the quince, that it is by no means certain that it may not soon fail if worked in whatever manner. In some places, however, double-working has given it smooth and fair fruit where it has been cracked and blighted on the pear. Both this and the Flemish Beauty, as well as the Marie Louise and some others, succeed well when grafted on the hawthorn.

The changes wrought by the quince stock are often important and interesting. T. Rivers states that the Aremborg

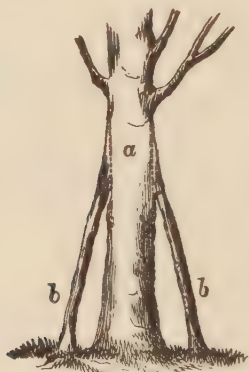


FIG. 636.



FIG. 637.

a, Trunk of Dwarf Pear-Tree; *b*, *b*, Pear-Stocks Inserted into it for New Bottom; *c*, Cut for Receiving the Pear Stock; *d*, Pear Stock, Cut Sloping before Insertion.

ripens several weeks earlier in winter; that the Easter is rendered more productive and matures its fruit, while on the pear it is a bad bearer, and does not ripen; that the *Fortunée* is a "perfect crab" upon the pear, but on the quince is melting and juicy; that the *Glout Morceau* is imperfect and ripens badly on the pear, but is always fair and attains a high and mature flavor on the quince. As a general effect, the size of the fruit is increased, but in a few cases it is rendered more gritty in texture.

Pruning Dwarf Pears.—Dwarf pear-trees are usually pruned into the *pyramidal* and *conical* form, the latter differing only in its broader shape. The principle to be adopted in pruning has been already explained on a former page; the extent to which it must be carried should be such as to keep the trees

within ten or twelve feet in height, and six or seven feet in diameter at the base. A greater height increases the difficulty of pruning. The same reason forbids the adoption of a head with a clean stem below, as in common standards.

The pyramidal mode of pruning may be applied to pear-trees upon pear stocks. Dwarf trees may be planted from ten to twelve feet apart. They will always need careful attention to pruning, and to thorough and enriched cultivation of the ground.

In planting out the dwarf pear, the quince stock should be planted a little below the surface to elude the borer, which often attacks the quince, but rarely the pear. It is sometimes planted deeper for the purpose of causing the pear to throw out roots of itself, thus changing the dwarf to a standard. This practice is objectionable, as such roots are apt to be few or one-sided, inclining or prostrating the tree. It is also desirable to retain the bearing character of the dwarf.

When dwarfs become old, or begin to decline, pear-roots may be given to them, and renewed vigor imparted, by planting a small pear tree closely on each side, and, when these become established, by inarching them into the tree, as shown in the annexed cuts. It is performed as follows:

Make a slit in the bark of the dwarf pear-tree, a few inches above ground, and across the lower end of the slit make a cross-cut, so as to form an inverted **1**. If the tree is large, make a notch instead of the cut, sloping downward, the better to admit the stock. Then bend the stock against this notch or cross-cut, and mark it at that point. Then, with a knife set with the edge upward at this mark, cut the stock off with a slope two or three inches long. It is then easily bent and inserted into the slit (see Figs. 636 and 637). It may be covered with grafting-wax, but grafting-clay is much better. This is made of clay or clay-loam one part, and horse-manure two parts, well mixed together—the addition of a little hair is an improvement. This is an Old World method which may be adaptable to a few trees in a garden, but is not applicable to commercial orchards.

Horizontal training, for walls or espaliers, is very rarely practised or needed in this country. It is occasionally employed in limited gardens, to form boundaries of walks, without occupying much lateral space, and where it is desired to

grow large and fine specimens of fruit by strong exposure to the sun. The mode may be briefly understood by the accompanying figure representing a partly grown tree (Fig. 638). As the tree advances, shoots will be produced from the sides of the horizontal arms; these must be stopped or pinched off early in summer, to prevent their drawing too hard on the rest of the tree, and a similar course pursued with them to that



FIG. 638.—Horizontal Training of Pear-Trees.

already described in a former chapter. The fruit-buds, and all the shoots or spurs supporting fruit-buds, are to be cut closely off wherever too thick for an even crop. Early in autumn the shortened shoots are to be cut down, leaving the fruit-buds only, to bear the next season. By this regularity of pruning, the tree will preserve a neat appearance, and bear regular crops.

The horizontal branches may be about one foot apart for large pears, and eight inches for small; and the trees, if on quince-roots, may be about ten feet apart.

Regrafting Large Pear-Trees.—Some of the varieties described in the following pages have already shown indications of becoming generally affected by cracking. In such cases it becomes desirable to regraft them with valuable sorts, or else thoroughly to spray each year with Bordeaux mixture.

The old and common way is to cut off the trunk or a few of the larger limbs, and insert a few grafts, say four or five in all, and compel them to form the whole new head, requiring the lapse of many years. A much better and more expeditious mode is to scatter the grafts through the top—inserting

so many that, each one forming a small branch of itself, the whole taken together will make a full top in a few years.

In order to render the operation plain, Fig. 639 is made to represent the unchanged tree at an age of from ten to twenty years. Many smaller branches are cut away, and those of medium size left distributed at as regular distances as may be. As the tendency of the growth is upward, the top should be rather worked downward in this operation, and the side



FIG. 639.



FIG. 640.



FIG. 641.

limbs near the bottom allowed a full chance. In the ends of these shoots some thirty or forty grafts are set, as shown in Fig. 640. Trees of the Virgalieu or Doyenné, which had become worthless by cracking, and which were large enough to bear a bushel or two annually, have been entirely changed in this way to better sorts, and yielding three years afterward larger crops than ever.

If the labor of inserting so many grafts is too great for ordinary practice, one-third or less may be set, as shown in Fig. 641.

Dwarf pear-trees of undesirable varieties may be readily changed in this way to other sorts—the more easily because they are lower, and accessible from the ground. Old dwarf

trees, which have become enfeebled by long bearing and sparse pruning, may be thus rendered thrifty and vigorous.

With trees of large size, it may be safest to change the upper half in one year, and the remainder the next, for the purpose of avoiding too great a check in growth.

Younger trees, or those but a few years old, of undesirable sorts, but of straight growth, may be used for stocks on which to work new heads of crooked or slow growers at standard height. Fig. 642 represents a tree of the Virgalieu worked over to the Winter Nelis, the former being a straight and handsome tree, and the latter the most crooked grower known. A few buds of the Winter Nelis are inserted into the side limbs of the Virgalieu so as to form an even, well-balanced head. The same result may be obtained by grafting these limbs in spring.



FIG. 642.

SYNOPSIS OF ARRANGEMENT.

DIVISION I. SUMMER PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

DIVISION II. AUTUMN PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

DIVISION III. WINTER PEARS.

CLASS I. *Distinct pyriform.*

CLASS II. *Obscure pyriform, obovate, or turbinate.*

CLASS III. *Roundish or oblate.*

FURTHER CLASSIFICATION OF FORMS.

In addition to the several general forms mentioned in the preceding synopsis, the shape is more particularly designated by comparison with well-known sorts. No fruit has so many forms as the pear in its different varieties; and to assist the fruit-grower in preserving a recollection of the distinctive characters of each, these forms are classified in the following pages. The distinction between pyriform, obovate, and oblate, which constitute the three principal divisions, has been already pointed out in the chapter on describing fruits; but there are many subdivisions, or less distinct modifications, which, if accurately observed, would additionally distinguish the different varieties. For example, *PYRIFORM* pears may be divided into *Bartlett-shaped*, where the general form is oblong, but both body and neck rounded and obtuse; *Winkfield-form*, longer and less obtuse; *Bosc-shaped*, when the body is broad and the neck long and narrow; *Tyson-form*, similar to Bosc, but with a shorter and acute neck; *Urbaniste-form*, shorter and less distinctly pyriform; *Diel-shaped*, where the body is large and rounded, and the neck short and obtuse; *Madeleine-shaped*, similar to the last, but of smaller body and lighter form.

Obovate pears may be either *Doyenné-form*, when they slightly approach pyriform; *Buffum-shaped*, or distinct obovate, when gradually rounded toward the stem with no approach to a neck; or *Bloodgood-shaped*, similar to the last, but often shorter and tapering, or rounded into the stalk.

These forms are, of course, more or less variable in the same varieties, but those more generally prevailing are adopted.

The illustrations of fruits in this chapter are all reduced one-half in diameter.

PYRIFORM.—Bartlett-shaped.



FIG. 643.—Bartlett.

FIG. 644.—Duval.

Winkfield-shaped.



FIG. 645.—Heyst.

FIG. 646.—Winkfield.

FIG. 647.—Verte Longue.

PYRIFORM.—Bosc-form.



FIG. 648.—Bosc.



FIG. 649.—Dupuy.



FIG. 650.—Conseiller de la Cour.



FIG. 651.—Pound.

PYRIFORM.—Diel-shaped.



FIG. 652.—Comice.

FIG. 653.—Diel.



FIG. 654.—Onondaga.

FIG. 655.—Worcester.

PYRIFORM.—Tyson-shaped.



FIG. 656.—Brandywine (two outlines).



FIG. 657.—Canas.



FIG. 658.—Wilmington.



FIG. 659.—Rosabirne



FIG. 660.—Ghislain

OBOVATE-PYRIFORM.—Urbaniste-form.



FIG. 661.—Urbaniste.



FIG. 662.—Pratt.

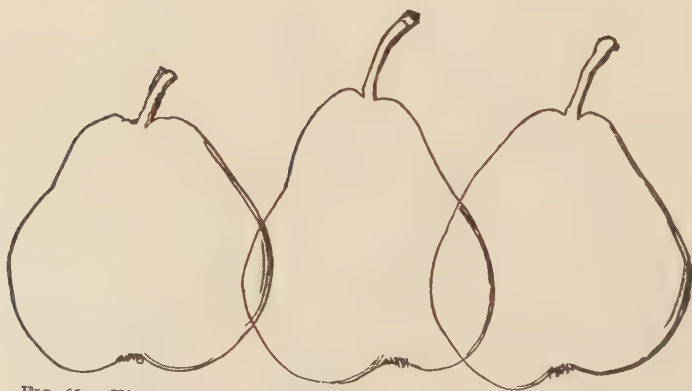


FIG. 663.—Kingsessing.

FIG. 664.—Kennes.

FIG. 665.—Langelier.

OBOVATE-PYRIFORM.—Madeleine-form.

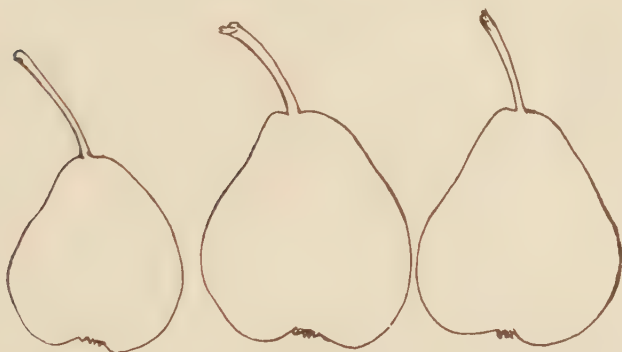


FIG. 666.—Madeleine.

FIG. 667.—Alpha.

FIG. 668.—Inconnue Van Mons.

OBOVATE.—Doyenné-form.



FIG. 669.—Boussock.

FIG. 670.—Cushing.

FIG. 671.—Defais.

OBOVATE.—Buffum-shaped.



FIG. 672.—Heatlicot.

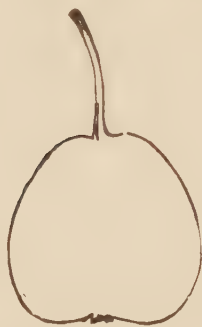


FIG. 673.—Lewis.



FIG. 674.—Dearborn.

SHORT OBOVATE.

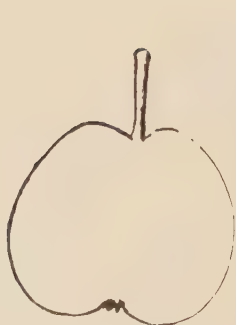


FIG. 675.—Cadette.



FIG. 676.—Siculle.



FIG. 677.—Hiver.

OBOVATE-TURBINATE.—Bloodgood-shaped.

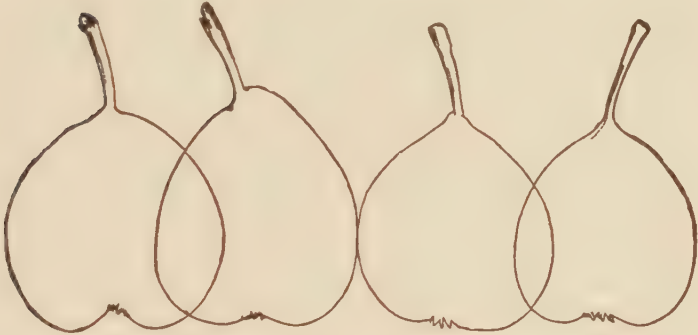


FIG. 678.
Bloodgood.

FIG. 679.
Henry IV.

FIG. 680.
Dundas.

FIG. 681.
Payency.

OBLATE.—Bergamot-shaped.

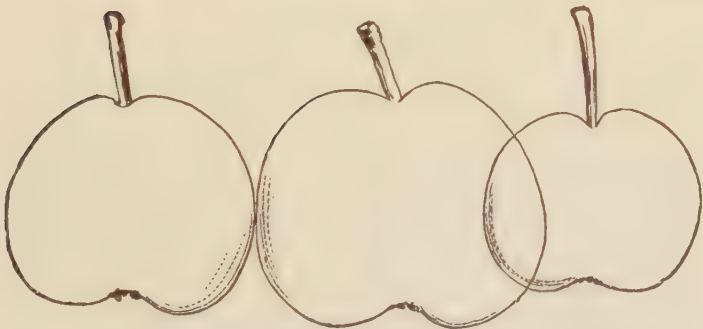


FIG. 682.—Beurré Goubalt.

FIG. 683.—Gansel Bergamot.

FIG. 684.—Fulton.

The quality of pears is remarkably liable to change from external causes. A difference in soil and cultivation exerts so great an influence with many fine sorts, that while they possess the highest flavor when growing on favorable ground kept rich and mellow, they become greatly inferior or even worthless in poor soil with neglected culture. Besides these, there are other influences dependent on a change of locality, all of which taken together, have contributed to the great diversity of opinion which exists in relation to many celebrated varieties. The pomologist will hence perceive the difficulty of weighing evidence for and against the different sorts, and of expressing a degree of quality that shall coincide with the opinions of all.

It will be understood, that the quality given on the following pages refers only to pears tested in this country. Some European varieties, which maintain a high character at home, prove of no value here.

In describing pears, it may be well to repeat that the term *base* applies in all cases to the part nearest the tree; and *apex*, to the part most remote. This is in accordance with universal practice among eminent botanists. The apex is usually termed the *crown*; and it is sufficiently evident that the crown (upper portion or surmounting part) cannot at the same time be the base.

DIVISION I.—SUMMER PEARS.

CLASS I. DISTINCT PYRIFORM.

Bartlett.* (Williams' Bonchretien.) Quite large, obtuse-pyriform, somewhat pyramidal; surface wavy, clear yellow, sometimes a faint blush; stalk an inch and a fourth long, stout, slightly sunk; basin little or none; apex slightly plaited, sometimes smooth; flesh nearly white, fine-grained, exceedingly tender and buttery, with a nearly sweet, sometimes faintly sub-acid, fine, moderately rich flavor. Ripens end of summer and beginning of autumn, and far North, is strictly an autumn pear. The fruit, when not fully grown, ripens and becomes of good quality if kept in the house a week or two. Growth erect, vigorous, leaves folded, slightly recurved, shoots yellowish. Tree very productive, and bears very young. Although not of the first class as to flavor, the many fine qualities of this pear render it a general favorite. Fig. 643. England.

Brandywine.* Size medium; conic-pyriform (Tyson-shaped), neck acute; smooth, dull yellowish-green, partly russeted, crown thickly russeted; stalk three-fourths to an inch and a half long, fleshy at insertion; flesh white, very juicy and melting, of fine flavor. Leaves rather small, shoots pale olive, vigorous, upright; tree not very productive. Ripens in August. A native of Delaware County, Pa. Grows well on the quince. Fig. 656.

Clapp's Favorite.* Large, pyriform, body large tapering to the crown, neck rather small; skin smooth, yellowish-green becoming yellow, dotted and shaded with red to the sun; stalk rather short,

FIG. 685.—Madeleine.

FIG. 686.—Tyson.



FIG. 687.

FIG. 688.

FIG. 689.

FIG. 690.

Giffard.

Pulsifer.

Skinless.

Rostiezer.

stout; calyx partly closed, basin small-wrinkled; flesh greenish or yellowish white, juicy, melting, perfumed, of very good quality. Ripens just before the Bartlett. Young shoots dark purple, growth strong and vigorous, resembling that of the Flemish Beauty, with which and the Bartlett it is supposed to be a cross. The fruit should be picked before it is fully ripe, or it will decay at the centre. Popular everywhere. Massachusetts.

Giffard.* Medium, pyriform, slightly Bosc-shaped, but shorter; skin greenish-yellow, marbled red on the sunny side; stalk rather long, calyx closed, basin small; flesh juicy, melting, slightly vinous, exceedingly agreeable. Middle of August. Shoots slender, reddish purple, growth straggling. Fig. 687. France.

Julienne. Size medium; slightly pyriform, approaching obovate, regular; whole surface clear yellow; stalk an inch long, rather stout; cavity small; calyx small, erect, or closed; basin rather shallow; flesh half buttery, sweet, of good flavor, but often poor on heavy soils. Late summer. Shoots yellowish. Productive, and bears when very young. Proves fine at the South.

Madeleine.* (Citron des Carmes, Magdelen, Green Chisel, *incorrectly*.) Medium in size, slightly pyriform, conic-obovate; skin smooth, pale yellowish-green, rarely a faint brownish blush; stalk slender, an inch and a half long; cavity very narrow and small; basin shallow; flesh juicy and melting, usually faintly acid, with an agreeable, delicate, fine, refreshing flavor. Matures about midsummer, or at the time of wheat harvest. Needs house-ripening. Shoots stright, erect, greenish, growth vigorous; tree rather liable to blight. Leaves quite flat. Fig. 685. France.

Pulsifer. Medium or rather small, pyriform, Madeleine or Rostiezer shaped; skin dull yellow, sometimes slightly russeted; stalk short, curved, slightly sunk; basin shallow; flesh juicy, melting, and when well ripened of a very good flavor. Middle of August. Shoots greenish, rather erect. Illinois. Fig. 688.

Rostiezer.* Rather small, sometimes medium in size; conic-pyriform, approaching obovate, nearly Madeleine-shaped, regular; skin dull brownish green, with a dark, dull, reddish brown cheek to the sun, with whitish specks, and traces of thin russet; stalk an inch and a half to two inches long, slender, scarcely sunk; basin little or none; flesh juicy, melting, sweet, with a very high, perfumed flavor, of high excellence. Ripens late in summer. For rich flavor, it has scarcely an equal among summer pears. Shoots dark, large, leaves broad. Fig. 690. Europe.

Skinless. (Sanspeau.) Rather small, long pyriform, body conic-ovate, regular; skin smooth, very thin, yellowish green, often dotted with reddish brown in the sun; stalk about an inch and a half long, slender, curved, cavity very small; calyx closed or erect, basin minute, slightly ridged, flesh half melting, juicy, with a sweet, slightly perfumed, good flavor. Ripens immediately after the Madeleine, or two weeks after harvest. Growth very vigorous, erect, leaves flat, wavy. A profuse bearer; fruit always fair. Fig. 689.

Supreme de Quimper. Medium or small, conic-obovate; yellow, shaded with red; stalk short, obliquely set, not sunk; calyx partly open; basin shallow; juicy, melting, perfumed. First of August. Becomes dry if not picked early. Shoots dark purple, rather erect.

Tyson.* Size medium, conic-pyriform, sometimes approaching obovate; bright yellow, with a reddish-brown softly shaded cheek, often some russet; stalk an inch and a fourth long, inserted into a fleshy prominence abruptly contracted from the rounded neck; basin very shallow, even; flesh of fine texture, buttery, very melting, juicy; flavor nearly sweet, aromatic, slightly perfumed, excellent. Ripens the last two weeks of summer. Shoots quite dark brown, erect, vigorous. The tree does not come soon into bearing. Pennsylvania. Fig. 686.

Wilder. Large, pyriform; pale yellow, shaded dark russet red; dots small, numerous; flesh pale yellow, fine-grained, tender, sub-acid, juicy. A Fox seedling. Very good.

CLASS II. OBSCURE PYRIFORM, OBOVATE OR TURBINATE.

Bloodgood.* Size medium, turbinate, approaching obovate, base contracted abruptly to the stalk; yellow, touched with russet; stalk fleshy at insertion, an inch and a fourth long, set on the rounded base without depression; calyx scarcely sunk; flesh yellowish white, buttery, and melting, with a fine, rich, aromatic flavor. Sometimes rots at the core. On some soils the flavor becomes poor and insipid. Ripens middle of August. Like all

FIG. 692.—d'Été.

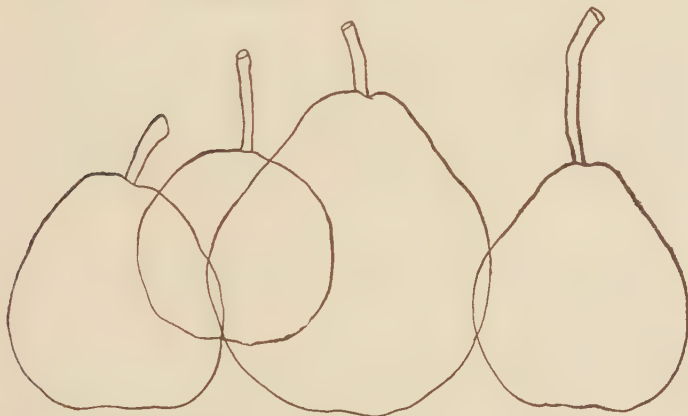


FIG. 692.—Osband's Summer.

FIG. 693.—Diel.

FIG. 694.—Ott.

early pears, it is best if house-ripened. Origin, Long Island, N. Y. Fig. 678.

Dearborn's Seedling.* Scarcely medium in size, obovate or Buffum-shaped, regular, smooth; surface clear yellow, with minute specks; stalk an inch long, sunk little or none; basin very shallow; flesh very fine grained, juicy, melting, and of fine flavor. Ripens nearly with the Bloodgood, or middle of August. Shoots straight, long, dark brown. Tree bears when young. Fig. 674. Massachusetts.

Henrietta. Size, a little below medium; obovate, crown flattened; stalk set on the rounded point of the neck; skin smooth, pale yellowish-green, dots few; stalk an inch and a half long, cavity small or none; calyx closed, basin shallow, faintly plaited; melting, juicy, sub-acid, with a good second-rate flavor. Very productive. Late summer. Origin, New Haven, Conn.

Limon. (Hagerston.) Size medium; obovate, sometimes slightly pyriform; light yellow, with a reddish-brown blush; stalk an inch and a half long; cavity round, even, shallow; calyx slightly sunk; flesh buttery, melting, of fine texture, with a mild, sweet flavor

slightly perfumed. Late summer. Shoots long, slender, reddish-brown. Belgian.

Manning's Elizabeth.* Small, obovate, Seckel-form, smooth; surface yellow, with a lively blush; stalk one inch long, cavity round, shallow; flesh very melting, saccharine, sprightly, perfumed, excellent. Early. Shoots diverging, dark reddish-brown. Does best on dwarf stock. Belgian.

Moyamensing. Medium or large, sometimes quite large, variable; round-obovate, rather irregular; skin lemon yellow, sometimes marked with russet; stalk nearly an inch long, fleshy; basin furrowed; flesh buttery, melting, good, but not first-rate. Ripens from midsummer till autumn, quickly decays. Productive. Origin, Philadelphia.

Muscadine. Size medium; short obovate, regular, sometimes slightly oblique; surface a little rough, yellowish-green, thickly dotted; stalk an inch and a fourth long, rather stout; cavity very small, even; basin rather wide, shallow; flesh buttery, melting, a little coarse, rather rich, slightly musky, faintly astringent, moderately good. Late summer, and early in autumn. Shoots rather thick.

Osband.* (Summer Virgalieu, *erroneously*.) Medium in size, often rather small, obovate, regular, smooth and even (Doyenné-shaped); sometimes remotely pyriform; greenish-yellow becoming yellow, with a reddish-brown cheek, often faintly russeted; stalk three-fourths to one inch long, slightly sunk in a nearly even cavity; calyx erect, in a round, nearly even, or slightly wrinkled basin; flesh white, granular, with a sweet, mild, and fine flavor; soon loses its flavor when mature. Ripens very early. Shoots yellowish-olive, thick. Origin, Wayne County, N. Y. Fig. 692.

Ott.* Small, roundish-obovate, or short Seckel-form; greenish-yellow, russeted in part, rarely a mottled red cheek; stalk an inch and a fourth long, cavity small; calyx rather large, basin shallow; flesh melting, rich, perfumed, aromatic, closely resembling that of its parent the Seckel. Ripens quite early, or by the first or middle of August. Shoots rather erect, brownish-green, leaves like Seckel. Origin, Montgomery County, Pa. Fig. 694.

Pinneo, or Boston. Size medium, obovate, slightly oblong, smooth; yellow when ripe, russeted around the stalk, which is long, straight, slightly sunk; basin moderate, wrinkled; flesh juicy, melting, pleasant, sweet, somewhat aromatic. Flesh dry, unless picked early. Late August. Shoots rather erect, light reddish-brown.

Summer Doyenné.* (Doyenné d'Été.) Small; round obovate, or short Buffum-shaped; stalk an inch or an inch and a fourth long, rather stout, slightly oblique, not sunk; basin very shallow; skin a fine yellow, with a warm cheek brightly reddened at the crown, and with radiating stripes of greenish-yellow from the calyx; flesh melting, juicy, sweet, with a pleasant, very good flavor. Skin thin; core small; seeds small, white. Ripens very early. Tree bears very young. Shoots slender, reddish-brown. Belgium.

CLASS III. ROUNDISH OR OBLATE.

Duchesse de Berry d'Été. Small, roundish, sometimes oblate, occasionally approaching obovate; yellow, sometimes shaded light red; stalk short, slightly sunk, basin shallow; juicy and melting, flavor "very good." End of August. Shoots stout, light greenish.

Muskingum. Medium, roundish; greenish-yellow, thickly dotted; stalk long, cavity small; basin shallow; flesh melting, pleasant, perfumed. End of August.

Reliance. Medium, oblate, brownish-red, russeted; flesh fine-grained, melting, juicy, good. A Van Mons' seedling. Tree vigorous, prolific.

Summer Portugal. (Passans du Portugal.) Size rather small, often nearly medium, roundish-oblate, regular; skin yellowish-green or pale yellow, with a handsome red cheek in the sun, formed of the reddened dots; stalk about an inch long; calyx stiff, erect; cavity and basin shallow; flesh white, breaking, tender, juicy, moderately good. Late summer. Very productive. Shoots upright, reddish-brown.

DIVISION II.—AUTUMN PEARS.

CLASS I. DISTINCT PYRIFORM.

Adams. Large, pyriform; deep yellow, smooth, shaded red next the sun; stalk short, stout, wrinkled at base; scarcely sunk, eye small, closed, even with the crown; flesh white, fine, melting, rich, vinous, perfumed. September and October. Shoots dark brown, tree upright. Massachusetts.

Alpha. Size medium, pyriform, obovate or Madeleine-shaped, smooth; pale yellowish-green, with a faint brown blush; stalk slightly sunk, basin moderate; fine-grained, buttery, and good. October. Belgian. Fig. 667.

Ananas d'Été. Rather large, obtuse-pyriform; skin smooth, clear yellow, with numerous small dots, often with a blush; stalk stout and fleshy; basin small; flesh fine-grained, buttery, and melting, sweet and very good. Early autumn. Growth somewhat irregular, shoots brownish-purple. Holland.

Andrews. (Amory, Gibson.) Medium or rather large, distinct pyriform, often slightly one-sided; skin thick, dull yellowish-green, with a broad, dull red cheek; stalk about an inch long, curved, scarcely sunk; basin shallow, sometimes deep; flesh greenish, very juicy, melting, of a fine, pleasant, agreeable flavor. On some localities not first-rate. Ripens early in autumn. Very productive and fair. Shoots diverging. Origin, Dorchester, Mass.

Angoulême.* (Duchess.) Very large, very obtuse-pyriform, sometimes oblong-obovate, surface uneven; greenish-yellow, often some russet; stalk an inch to an inch and a half long, very stout; cavity deep, often wide; calyx small, basin uneven; flesh yellow-

ish-white, melting, buttery, juicy, good when well grown, poor or worthless when small; succeeds admirably and is best on quince stock. It has been remarked that when this pear weighs less than four ounces it is worthless in flavor. Ripens mid-autumn and later. French. Mostly grown as a dwarf. Fig. 696.

Autumn Paradise.* (Paradise d'Automne.) Rather large, distinct pyriform; surface uneven, yellowish-orange, with some thin russet patches; stalk an inch and a half long, not sunk; basin small, irregular; flesh melting, very buttery, with a rich, high, and ex-

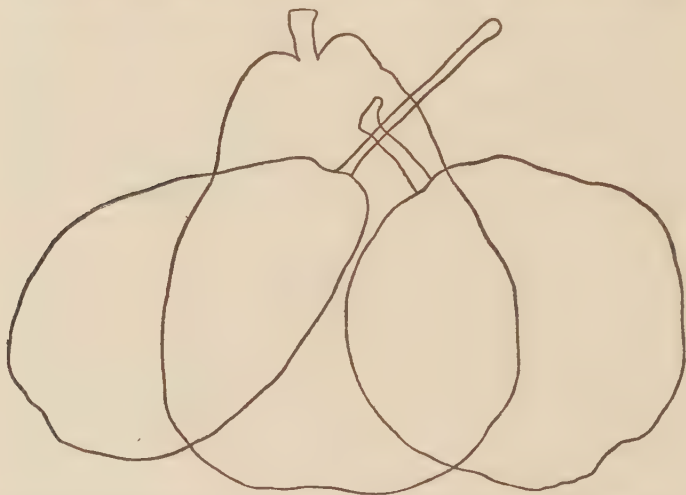


FIG. 695.—Jargonelle. FIG. 696.—Angouleme. FIG. 697.—Garber.

cellent flavor. Ripens about mid-autumn. Shoots yellowish, at first upright, afterward becoming straggling, growth vigorous. This pear resembles the Bosc, but is less smooth, more irregular in form, has a less narrow neck, and more vigorous growth. Shoots yellowish-brown, speckled, irregular, leaves finely serrated, slightly wavy. Belgium.

Bachelier. Rather large, obovate, pyriform, irregular; green; stalk rather short, obliquely set; calyx partly closed, basin shallow; buttery, melting, vinous, aromatic, flavor moderate. November, December. Shoots reddish-yellow, vigorous. Large, well-grown specimens are sometimes nearly Bartlett-shaped, small ones approach roundish-obovate. Bark of the tree cracks.

Baronne de Mello. (Adele de St. Denis.) Medium, conic-pyriform (often Tyson-shaped,) sometimes obovate or turbinate, variable; skin rough, much russeted; stalk fleshy at insertion; flesh rather coarse, very juicy and melting, vinous or sub-acid, of moderate quality. October. Tree vigorous, a great bearer.

Bergen. Large, pyriform, sometimes approaching obovate or turbinate, smooth; yellow, with a handsome cheek; stalk curved, slightly sunk; calyx and basin small; fine-grained, buttery, melting, sweet, excellent. Last of September. Long Island.

Bosc.* (Calebasse Bosc.) Large, very distinct pyriform, neck rather long and very narrow, acute, body broad; surface nearly smooth, deep yellow, russeted in patches; stalk an inch and a half long, slender, curved; basin very shallow; flesh juicy, buttery, rich, perceptibly perfumed, sweet, excellent. Mid-autumn. Fails on quince stocks and is a very crooked grower. In order to obtain good dwarf or standard trees it should be double-worked. Belgian. Fig. 648.

Canandaigua. Rather large, pyriform, somewhat irregular (Bartlett-shaped); lemon yellow; stalk rather short, oblique; basin small; flesh buttery, melting, rather rich. September. Shoots strong, erect, light purplish-red.

Capiaumont. (Beurré de Capiaumont.) Size medium, conic pyriform, or Tyson-shaped, quite acute, approaching turbinate regular; skin smooth, yellow, with cinnamon red to the sun, distinctly dotted, slightly russeted; calyx widely reflexed, not sunk; stalk about an inch long, but varying; flesh white, buttery, melting, moderately juicy, sweet, often astringent, about second quality. Hardy and productive. Leaves folded, recurved. Ripens about mid-autumn. Belgian.

Comice.* Large, roundish-pyriform, somewhat pyramidal; greenish-yellow, becoming fine yellow at maturity, often with a faint crimson blush, slightly russeted, thickly dotted; stalk short, stout, set obliquely in a small cavity; calyx small, in a deep, uneven basin; flesh white, fine, melting, with a sweet, rich, slightly aromatic flavor. Keeps long after fully ripe. October and November. Young wood apt to be injured. France. Fig. 699.

Comte de Paris. Size medium, pyriform, approaching obovate, regular; skin thick, somewhat rough, bright green, becoming yellow at maturity; flesh nearly white, buttery, melting, juicy, with a agreeable perfume. Ripens in October, and continues in use a long time. One of Van Mons' seedlings. The tree is vigorous, with a stout erect growth, and appears to succeed well on the quince.

Chancellor. Large, obtuse pyriform, large specimens early Bartlett-shaped, small ones obovate; green; stalk an inch long, rather thick; cavity small, irregular; calyx small, basin contracted; flesh melting, rich, agreeable. Mid-autumn. Germantown, Pa.

Comte de Flandre. Rather large, pyramidal-pyriform, often oblique; skin yellow, with small dots and thin russet; stalk long, set under a lip, with a little depression; basin shallow; flesh juicy, melting, with an agreeable, refreshing flavor, very good. November.

Conseiller de la Cour. (Maréchal de la Cour.) Large, pyriform

(somewhat Bosc form); greenish-yellow, slightly russeted; stalk slender, not sunk; basin small, calyx small, nearly closed; flesh white, melting, sub-acid, juicy, of fine quality. Late autumn and early winter. Tree vigorous, productive. Succeeds on quince. Foreign. Fig. 650.

Countess of Lunay. Size medium, obovate-pyriform, somewhat conic; skin smooth, pale waxen yellow, with a thin red cheek; stalk about an inch and a half long, set without depression on the rounded point of the neck, which is slightly russeted; basin very

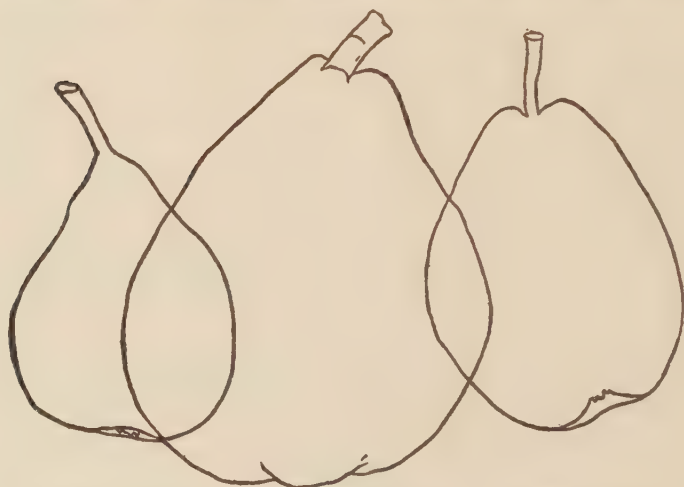


FIG. 698.—Nantais.

FIG. 699.—Comice.

FIG. 700.—Dix.

small, even; flesh white, very juicy, melting, fine, very good. Mid-autumn.

De Tongres. (Durandea.) Large, pyramidal-pyriform, surface uneven or knobby; yellow, with bronze russet and red stripes; juicy, melting, rich, sub-acid, perfumed. October, November. A large, handsome, and excellent pear, but the tree is rather tender. Shoots light brown, slender, spreading, leaves narrow.

Diel.* (Diel's Butter.) Large, sometimes very large, thick pyriform, neck short, obtuse, body very large; small specimens approach obovate; skin dull yellow, with numerous conspicuous dots, and some russet; stalk an inch and a fourth to an inch and a half long, stout, moderately sunk; basin slightly furrowed; flesh rather coarse, rich, sugary, buttery, juicy, fine. Late autumn and early winter. Shoots large, spreading, irregular; leaves roundish or broad. Succeeds well on quince stocks. Belgian. Fig. 693.

Dix. Large, long pyriform, body round-ovate, tapering slightly

to the often oblique and slightly flattened and obtuse crown; yellowish green, becoming deep yellow; dots numerous, distinct; stalk an inch and a quarter long, stout at each end, slightly sunk; basin small; flesh rather granular, rich, juicy, sweet, often excellent, sometimes rather acid. The fruit often cracks. Middle and late autumn. A tardy bearer. Shoots yellow, rather slender, often thorny; leaves flat. A native of Boston, Mass. Fig. 700.

Duc de Brabant. (Waterloo, Meil de Waterloo, Fondante de Charneuse, Beurré Charneuse, Belle Excellente, Excellantissima.) Large, roundish-pyriform, tapering to crown (somewhat Onondga-shaped), neck small; greenish, dotted green, shaded crimson on the sunny side; stalk long, curved, scarcely sunk; basin irregular, ribbed; flesh greenish white, buttery, and melting, with a refreshing vinous flavor. October, November.

Duchesse d'Orleans. Large, often only medium, sometimes long pyriform, but usually obovate-pyriform, somewhat pyramidal; skin golden yellow, slightly russeted, sometimes nearly overspread with russet, with a red cheek; stalk thick, about an inch and a half long, scarcely sunk; basin small, even; flesh buttery and melting, rich; when well ripened, delicious. Ripens mid-autumn. A handsome, fine, French variety. Growth rather spreading, shoots yellowish green.

Duval. Medium, obtuse pyriform or Bartlett-shaped; pale green; buttery, melting, with good flavor. October, November. Productive. Fig. 644.

Dumas. (Belle Épine Dumas, Duc de Bordeaux.) Medium, long pyriform; greenish-yellow; stalk long, scarcely sunk; basin shallow, regular; calyx partly closed; buttery, half melting, sweet, flavor peculiar. Late autumn. Growth vigorous, succeeds on quince. Shoots dark, speckled; leaves narrow.

Emile d'Heyst. Large, long pyriform (like the Winkfield); light green with some brown russet; stem variable, rather long, sometimes fleshy; calyx small, basin narrow, deep, and knobby; buttery and melting, fine, perfumed. November. Shoots long, brownish-yellow, diverging and straggling. Fig. 645.

Figure. Medium or rather large, pyriform-pyramidal, regular, body rounding to the apex; skin thin, green, partly russeted at crown, often a dull red cheek; stalk an inch long, stout, very fleshy at insertion, not sunk; basin none; flesh rather coarse, melting, juicy, rich, high flavored. Late autumn.

Figure Alencon. Large, irregularly pyramidal or pyriform; green, spotted with russet; flesh melting, juicy, vinous, sprightly, excellent. October to December. Tree vigorous, productive. Shoots reddish-purple, leaves thick.

Forelle. (Trout Pear.) Medium or rather large, pyriform, approaching oblong-obovate; green, becoming clear yellow, with a deep vermilion cheek, dots margined with crimson; stalk an inch long, slender; cavity moderate; basin rather abrupt and narrow; flesh buttery and melting, but not rich. Late autumn. Shoots

dark, purplish; leaves small, nearly flat. German. A pear of great beauty, which has contributed to its reputation.

Graslin. Large, pyramidal-pyriform, often tapering to the crown; skin thick, green, slightly russeted; stalk long, slightly sunk; basin furrowed, flesh coarse, buttery, melting, rich, vinous. October, November.

Harvard. Medium or rather large, oblong-pyriform; skin russety olive-yellow, and with a reddish cheek; stalk rather stout, sunk little or none, oblique; basin narrow; flesh juicy, melting, tender; rots at the core if not house-ripened. First of autumn. Very pro-

FIG. 701.—Marie Louise.

FIG. 702.—Comte de Flandre.



FIG. 703.—Swan's Orange. FIG. 704.—Louis Bonne.

ductive, growth vigorous, fruit handsome, rendering it profitable for market, although only second-rate in quality. Origin, Cambridge, Mass.

Kennes. Medium, pyriform, somewhat Urbaniste-shaped; greenish-yellow, russeted; stalk thick, fleshy at insertion; calyx partly closed; basin broad, shallow; buttery, melting, sweet, rich, perfumed. Excellent. October. Must be house-ripened. Fig. 664.

Lodge. Medium, pyriform, neck small, narrow, very acute, sometimes ribbed and irregular; greenish-brown, much russeted; stalk long, rather stout, curved; basin varying from shallow to deep; flesh juicy, melting, with a rich, vinous, sub-acid, Brown Beurre flavor. Early and mid-autumn. Philadelphia, where it proves very good, but farther North does not stand so high. Shoots slender, yellowish-brown, erect, and diverging.

Long Green. (Verte Longue.) Rather large, long-pyriform, the ends rather acute, stem oblique; surface wholly green; flesh very juicy, with a good and agreeable flavor. The Striped Long Green is a sub-variety.

Long Green of Autumn (*Verte Longue d'Automne*, or *Mouth-water*) is quite distinct, being smaller, much more rounded, stem long, and with a brown cheek; very juicy and pleasant; ripens late in autumn, a month after the preceding. Profusely productive, and valuable.

Louise Bonne.* (*Louise Bonne de Jersey*, *Louise Bonne d'Avranches*.) Large, pyriform, tapering slightly to obtuse or flattened crown; slightly one-sided; surface smooth, pale yellowish-green, with a brownish red cheek; stalk an inch to an inch and a half long, often fleshy at insertion, little sunk; basin shallow; flesh yellowish-white, very juicy, buttery, melting, rich, faintly sub-acid, fine. Ripens mid-autumn; late autumn far North, early autumn at Cincinnati. Very productive; succeeds admirably and is mostly grown on quince stocks. Shoots dark brown or purple; serratures of the leaves rather coarse. This fine variety, like the Bartlett, is hardly of the highest quality, but is eminently valuable for its large, fair fruit, free upright growth, and great productiveness. France. Fig. 704.

Madame Eliza. Large, pyriform, approaching pyramidal; skin green, becoming nearly yellow; flesh buttery, melting, sweet, perfumed, agreeable. November. Shoots greenish-brown, erect. Belgian.

Marie Louise. Large pyriform, a little one-sided, or with a curved axis; body somewhat conical; surface pale green, becoming yellowish, partly russeted; stalk an inch and a half long, rather stout, often oblique; calyx small, basin narrow, plaited; flesh buttery, melting, vinous, when well grown rich and fine—often second or third rate—variable. Needs rich cultivation or else the fruit will be poor. Mid-autumn. Growth very flexuous and straggling; shoots olive-gray, petioles very long, leaves narrow. Belgian. Fig. 701.

Millot de Nancy. Medium or below, distinct pyriform; orange russet on dull yellow; stalk an inch long, not sunk; flesh buttery and melting, moderately juicy, and rich, sweet, aromatic. October, November. Belgian.

Moire. Rather large, pyriform, approaching obovate; greenish-yellow; stalk stout, curved, cavity uneven, basin shallow; flesh yellowish, slightly granular, buttery, melting, rich, variable, often very good. October. Shoots purple, leaves wavy.

Nantais. (*Beurré de Nantes*.) Large, long pyriform or pyramidal; greenish-yellow, with a red cheek; stalk large, set under a lip, not sunk; calyx large, in a broad, furrowed basin; juicy, perfumed, very good. October. Fig. 698.

Napoleon. Medium or rather large; conic-pyriform, obtuse, variable; green becoming pale yellowish-green; stalk an inch long, stout, slightly sunk; basin rather large; flesh uncommonly juicy, melting, moderately rich, good, often astringent and worthless. From mid-autumn till winter. Needs ripening in a warm room. Very productive, thrifty, hardy. Shoots rather erect. Belgian. Best on warm, light soils.

Nouveau Poiteau. Medium or large, conic-pyriform, sometimes approaching obovate, greenish, much russeted, and thickly dotted; stalk rather short, often fleshy at insertion, not sunk; calyx closed, basin moderate; flesh buttery, melting, somewhat vinous, very good when well grown. November. A strong grower, shoots brownish red, and forms a handsome pyramid on quince. Belgian.

Onondaga.* (Swan's Orange.) Quite large, obtuse oval-pyriform, nearly in the form of a double cone, neck very short and obtuse, body large and tapering to obtuse apex; skin roughish, greenish-yellow, becoming rich yellow, dots numerous, often a slight brown cheek, crown often slightly russeted; stalk an inch to an inch and

FIG. 705.—Ontario.

FIG. 706.—Van Mons.



FIG. 707.—Seneca. FIG. 708.—Worden's Seckel.

a half long, stout, slightly sunk; calyx small, closed, basin narrow, ribbed; flesh slightly coarse, buttery, melting, sometimes a little breaking, juicy, rich, fine, but not of the highest quality, sometimes astringent. Ripens mid-autumn. Growth vigorous. shoots yellow, ascending. Productive. Connecticut. Figs. 654 and 703.

Ontario. Medium or rather large, oblong-pyriform (somewhat Bartlett-shaped, but more obovate), sometimes faintly ribbed, somewhat irregular; pale yellow, thickly dotted; stalk an inch long; cavity small, irregular; calyx open or partly closed; basin wrinkled; flesh buttery, melting, with a mild, pleasant, agreeable flavor. First of October. Shoots yellowish-red, rather erect. Geneva, N. Y. Fig. 705.

Parsonage. Medium or large, pyramidal-pyriform, approaching conic-obovate; skin orange yellow, partly russeted, thickly dotted;

stalk short, thick; cavity small; calyx partly open, basin shallow; flesh granular, melting, juicy, rich. September. New Rochelle, N. Y.

Payency. (Paquency.) Size medium; pyriform approaching obovate-conic (Tyson-shaped); skin dull yellow, slightly russeted, with a faint dull blush; stalk an inch long, stout; calyx erect, basin shallow; flesh white, juicy, melting, good. Mid-autumn. French. Fig. 677.

Pratt. Medium or rather large, obovate-pyriform; skin greenish-yellow, thickly dotted; stalk an inch long, slender and moderately sunk; basin wide, shallow; flesh tender, melting, juicy, excellent. Early autumn. Shoots yellowish, erect, leaves rather narrow, recurved. Rhode Island. Fig. 662.

Queen of the Low Countries. Large pyriform, neck narrow, body broad or slightly oblate (Bosc-shaped); surface slightly uneven, dull greenish-yellow, crown russeted, with numerous, often confluent russet dots, and a slight blush; stalk an inch and a half long, curved, not sunk; calyx small, rather deep-set, basin ribbed; buttery, melting, juicy, moderately rich, sub-acid, with a second-rate, Brown Beurré flavor. Mid-autumn. Belgian.

St. Ghislain. Size medium, pyriform, neck narrow, acute, tapering; surface pale yellow, sometimes a faint blush; stalk an inch and a half long, curved with fleshy rings at insertion; basin very shallow; flesh white, buttery, juicy, with a fine flavor. Growth upright, vigorous, shoots light brown. Somewhat variable in quality. Belgian. Early autumn. Requires high cultivation. Fig. 660.

St. Michel Archange.* (Plombgastel.) Rather large, pyramidal-pyriform, greenish yellow, thickly dotted, partly russeted; stalk medium length, stout, fleshy at insertion, not sunk; calyx closed, basin small, uneven; flesh rather coarse, juicy, rich, aromatic. October. Shoots greenish, quite erect, leaves narrow, light green. Tardy bearer.

Selleck. Large, obtuse-pyriform (Diel-shaped), ribbed; fine yellow, thickly dotted; stalk long, curved, fleshy at insertion; cavity moderate, calyx closed; basin small, uneven; flesh white, juicy, melting, rich, aromatic, excellent. September, October. Shoots slender, brownish-yellow.

Seneca.* Large, obovate-pyriform; stem nearly two inches long, flattened at junction, with fleshy ridge; basin large, irregular, light yellow, bright green mottlings, black dots, blush on side; flesh white, fine-grained, melting, vinous, sprightly. Very good. September. Fig. 706.

Soldat Laboureur. Rather large, pyriform; skin becoming yellow when ripe, slightly russeted; stalk rather stout, curved, slightly sunk; cavity small, abrupt; basin small; flesh granular, melting, juicy, and when well grown of a rich, vinous flavor; variable, often poor. Late autumn. Shoots erect, light greenish-brown. Belgian.

Soulange. Rather large, acute or conic, pyriform, or with neck

tapering into stalk, which is stout, curved, and fleshy; pale yellow, with traces of russet; basin and calyx rather large; melting, very juicy, rich, aromatic. September, October.

Souvenir Esperen. Large, pyriform, obovate, tapering to crown, dull yellow, with a mottled red cheek; melting, vinous. Shoots yellow, erect. November. Belgian.

Sterkmans. (Doyenné Sterkmans.) Size medium, short pyriform, broad at the crown, slightly ribbed; skin greenish-yellow, dotted and shaded red to the sun; stalk an inch or more long; cavity small, uneven; basin rather large, uneven; flesh fine-grained, buttery, and melting, with a very good, slightly vinous flavor. Late autumn.

Theodore Van Mons. Rather large, obovate-pyriform, sometimes long pyriform; greenish yellow, somewhat russeted; stalk an inch long, scarcely sunk; calyx large, open; flesh granular, juicy, melting, varying from good to very good. September, October. Tree vigorous and productive on pear or quince. Fig. 706.

Triomphe de Jodoigne. Quite large, obtuse-pyriform, irregular and uneven; skin rough, thick, greenish-yellow, with russet dots; stalk large; calyx partly closed in a small basin; flesh coarse, juicy, buttery, musky, of moderate quality. Late autumn, keeps into winter. Growth vigorous, spreading, irregular.

Urbaniste.* (Beurré Piquery.) Medium or rather large, conic-pyriform, obtuse and short, often approaching obovate; skin pale yellow or greenish, faintly russeted; stalk an inch long, stout, moderately and sometimes considerably sunk; calyx erect or closed; basin distinct, even; flesh melting, buttery, with a fine, delicious flavor, and a perceptible shade of acid. In unfavorable localities, it is sometimes of moderate quality. Middle and late autumn. Does not come soon into bearing. Shoots slender, greenish-yellow, leaves narrow, recurved. Belgium. Fig. 661.

Van Mons Le Clerc. Large, long pyriform, obtuse; surface yellowish-green, slightly russeted; stalk an inch and a fourth long, stout, little sunk; calyx small, basin very shallow; flesh fine grained, yellowish-white, buttery, melting, rich, fine. Ripens middle and late autumn. A native of Laval, in France. The value of this fine pear is nearly destroyed by its liability to crack and canker.

Verte Longue of Angers. Large, distinct pyriform (nearly Bosc-shaped); green; stalk rather short, oblique, not sunk; basin rather small; flesh greenish-white, juicy and melting, agreeably perfumed. October. Belgian. Resembles Long Green (or *Verte Longue*). Fig. 647.

Wilmingtton. Medium, pyriform, approaching obovate; cinnamon russet on yellow ground; cavity slight, often none; basin rather large; flesh fine, melting, buttery, rich, aromatic. September. Philadelphia. Fig. 658.

Worden.* Medium, conic-pyriform; golden yellow, one side bright crimson; stem, one and one-quarter inches long, not curved slight fold at base; basin shallow; flesh dull white, very juicy, buttery

fine-grained, melting, excellent. A seedling of Seckel, which it surpasses in size, beauty, and keeping qualities. Ripe in October, but will keep till December. New York. Fig. 708.

CLASS II. OBSCURE PYRIFORM, OBOVATE, OR TURBINATE.

Abbott. Medium in size, oblong-obovate (like the Washington); surface even, smooth, dark dull green, with a reddish-brown cheek changing to scarlet; stalk an inch long; calyx small, closed; melting, juicy, rich. Early mid-autumn. Good and handsome, shoots purplish. Providence, R. I.

Amalis. (Beurré d'Amanlis.) Large, obovate, often irregular, sometimes slightly pyriform, with a short and narrow neck; dull yellowish-green, with some russet, and a dull reddish cheek; stalk an inch and a quarter long, very slightly sunk; basin shallow; flesh buttery, melting, and juicy, and rather rich, with a moderate, often astringent and poor flavor. Early and mid-autumn. A strong grower, great bearer, tree spreading, irregular; leaves sharp serrate.

Anjou.* Rather large, obtuse Doyenné-form, regular; surface greenish-yellow, a dull red cheek to the sun, clouded with russet; stalk quite short, or half an inch long, lightly sunk; cavity uneven, basin shallow, round, smooth; flesh yellowish-white, fine-grained, buttery, melting, with a high, rich, vinous, excellent flavor. Shoots light green, leaves recurved, wavy. Begins to ripen in the middle of autumn, and keeps long, sometimes into midwinter. The hardiness, uniformity, reliability, excellence, and long-keeping qualities of the Anjou render it one of the most valuable of all pears. French. Fig. 711.

Augustus Dana. Medium or large, obovate; skin dull green, slightly rough, partly russeted, thickly dotted; stalk long, curved, scarcely sunk on the obtuse end; eye large, slightly sunk; flesh juicy, melting, rich, aromatic. October and November. Growth irregular, thorny, like Dix. Massachusetts. New.

Auguste Royer. Medium, turbinate; skin russet-fawn, becoming orange; juicy, rich, perfumed. November. Vigorous and productive.

Belle Lucrative.* (Fondante d'Automne.) Size medium, conic-obovate, sometimes remotely pyriform; surface pale yellowish-green, slightly russeted; stalk an inch and a quarter long, often fleshy, oblique; cavity very small and narrow; calyx short; basin smooth, sometimes furrowed; flesh very juicy, with a fine texture, melting, rich, excellent. Variable—when well grown and fully ripened, it has no superior and few equals, in its exceedingly rich, delicate, perfumed flavor—but sometimes of poor quality. Middle or last of September. Belgian. Growth moderate, upright, shoots yellowish-gray. Fig. 709.

Bergamotte Cadette. (Beauchamps, Beurré Beauchamps, Poire de Cadet.) Size medium, round-obovate, or round-oval; surface greenish-yellow, often russeted, frequently tinged with reddish-brown to the sun; stalk an inch and a fourth long, scarcely sunk

on the rounded base; calyx erect or closed, basin very shallow, flesh melting, buttery, juicy, sweet, quite rich, slightly perfumed. Late autumn. Shoots greenish, slender, erect, and diverging; leaves small. Productive. French. Fig. 675.

Berkmans. Medium, turbinate, or short pyriform; yellowish, rough, russeted; stalk fleshy, oblique, basin shallow, furrowed; buttery and melting, rich, and perfumed. November, December.

B. S. Fox. Large, obtuse obovate, russet yellow; flesh fine-grained, very juicy, vinous. A Fox seedling from California. Very good.



FIG. 709.

Belle Lucrative.

FIG. 710.

Edmonds.

FIG. 711.

Anjou.

FIG. 712.

Buffum.

Navey. Rather large, roundish obovate, obscurely pyriform; yellow, with some russet; stalk large, often fleshy, cavity slight; basin moderate; flesh buttery and melting, rich, sub-acid, aromatic, perfumed, very good. October, November.

Beymont. (Beurré Bieumont.) Size medium, obovate (Bloodgood-shaped); crimson russet; stalk long, curved, calyx small, basin shallow; melting, very sweet, rich, perfumed. October to December.

Bon Chretien Fondante, or "Melting Bonchretien." Size medium, roundish, slightly oblong, rarely short obovate, obtuse; surface dull green, partly russeted, numerous dotted; stalk an inch long, moderately or slightly sunk; basin small; flesh yellowish-white, or yellow and rather gritty, melting, very juicy, rich, pleasant, somewhat variable. Ripens about mid-autumn or later. Hardy, vigorous. Leaves conspicuously folded and recurved.

Boussock.* (Doyenné Boussock, Doyenné Boussock Nouvelle.)

Large, thick obovate, sometimes slightly pyriform, slightly uneven; surface bright lemon yellow when ripe, partly russeted, sometimes a slight reddish cheek; stalk stout, about an inch long, varying, sometimes fleshy, often oblique; basin very shallow, even; flesh buttery, melting, very juicy, with a very good flavor. Ripens middle of September. Shoots diverging, purplish. A valuable and reliable pear; requires early picking. Belgium. Fig. 669.

Brown Beurre. (Beurré Gris, Grey Beurré, Beurré Rouge, Red Beurré, Beurré Isambert.) Large, often only medium, oblong-obovate, with a rounded taper to the stalk; skin yellowish-green, russeted; stalk an inch to an inch and a half long, rather oblique, thickening into the fruit; basin rather shallow; flesh greenish-white, very juicy, melting, buttery, with a rich acid or vinous flavor. Early mid-autumn. Variable in quality.

Buffum.* Size medium, obovate; skin yellow, with a broad, reddish-brown cheek, somewhat russeted; stalk three-fourths of an inch long, stout; cavity and basin moderate or small; flesh buttery, sweet, very good, slightly variable. Shoots strong, reddish-brown, very erect; tree very productive. Valuable for its fair fruit, and fine bearing qualities. Ripens end of September, but should be picked two weeks before, or it becomes mealy. Origin, Rhode Island. Fig. 712.

Cabot. Size medium, round-obovate, slightly irregular, crown full, obtuse; stalk an inch long, set on the pointed base without depression; surface rough, russeted, bronze yellow; basin round, smooth; flesh greenish-white, breaking, somewhat melting, juicy, sub-acid, good. Early mid-autumn. Tree vigorous, very productive. Hardy, reliable. Origin, Salem, Mass.

Capsheaf. Rather small, short obovate, wide at crown, somewhat conic, or with a rounded taper to the stalk; surface deep yellow, mostly russeted; stalk an inch long, stout, slightly sunk; calyx small, basin rather large; flesh melting, juicy, buttery, mild, sweet, good, of second quality. Ripens mid-autumn. Shoots erect, stout, yellowish-brown; very productive. Rhode Island.

Collins. Size medium, obovate, approaching turbinate; greenish-yellow; stalk short, thick, oblique, not sunk; calyx small, scarcely sunk; flesh juicy and melting; of medium quality. First of October. Massachusetts.

Comte de Lamy. Rather small, roundish-obovate (Bloodgood-shaped); yellow, with dots and thin russet; stalk an inch long, set under a lip, scarcely sunk; basin shallow; juicy, melting, refreshing, agreeable. October. Shoots reddish, erect.

Cushing. Medium or rather large, obovate, or Doyenné form; surface light greenish-yellow, rarely a dull red cheek; stalk an inch long, cavity abrupt; basin rather shallow; flesh fine-grained, buttery, melting, with a fine flavor, nearly first-rate. Ripens in the early part of autumn. Shoots spreading. Very productive. Origin, Hingham, Mass. Fig. 670.

Dallas. Size medium, obovate, slightly conic-pyriform; dull yellow, often much russeted; stalk an inch long, not sunk; basin

round, slightly wrinkled; segments of the calyx rounded, stiff, flesh fine-grained, melting, juicy, good. Ripens late autumn. Connecticut.

Delices d'Hardenpont of Angers. Medium, obovate-turbinate, sometimes conic, approaching pyriform; greenish-yellow, with some russet; stalk short, thick, fleshy at insertion; cavity little or none; calyx and basin small; flesh slightly coarse, juicy, rich, perfumed. October, November.

Defais. Size medium, obovate, or short Doyenné form, sometimes obscurely pyriform; waxen yellow, with a bright red cheek; stalk curved, cavity broad and deep; calyx large, basin broad and deep; buttery and melting, sweet, rich, perfumed. October, November. Fig. 671.

Dillen. Large, oblong-pyramidal, pyriform; fine yellow, russeted, dotted; stalk short, thick, fleshy; calyx rarely open; basin moderate; flesh juicy, buttery, sweet, and rich. November, keeping into December.

Downing. Medium, roundish-ovate; green, becoming yellow, thickly dotted; stalk short, obliquely set; basin small; flesh a little coarse, juicy, melting, rich, vinous. September.

Duchesse Helene. Large, obovate, somewhat pyriform, oblique; green, becoming yellow, slightly russeted, rough; stalk short, under a lip; basin narrow; buttery, melting, rich, vinous, slightly astringent. October, November. Belgian. New.

Dumortier. Medium, roundish obovate; dull yellow, somewhat russeted; stalk long, slender, not sunk; calyx and basin small; flesh greenish-white, juicy, melting, rich, aromatic, perfumed. September.—quickly decays. Belgian.

Dundas. Size medium, short turbinate, sometimes obovate, base flattened; skin yellow, with a brilliant blush; stalk an inch long, stout, not sunk; calyx small, basin wide, deep, and even; flesh half buttery, tender, melting, rich, perfumed. Mid-autumn. A handsome Belgian variety. Fig. 680.

Dunmore. Large, oblong-obovate; surface greenish, with dots of brownish-red russet; stalk an inch and a half long, stout, fleshy at insertion, scarcely sunk in the obtuse and rounded base; calyx small, deep set; flesh buttery, melting, rich, often acid, sometimes astringent. Early autumn. English.

Edmonds. Medium to large, obovate; surface irregular; stalk long, stout and fleshy toward the base, set in a moderate, knobby cavity; basin ribbed or uneven; flesh yellowish-white, very fine-grained, melting, with a sweet, peculiar, excellent flavor. September. Shoots very stout, greenish-brown; leaves thick, folded, recurved. Rochester, N. Y. Introduced by Ellwanger & Barry. New. Fig. 710.

Figue de Naples. (Fig Pear of Naples.) Medium, or rather large, oblong-obovate, sometimes slightly obovate-pyriform, base very obtuse; surface yellowish-brown, with a faint reddish cheek; stalk an inch long, fleshy at insertion; basin broad, shallow, smooth:

flesh buttery, not rich, becoming dry unless kept from the air. Ripens late autumn. Hardy and productive.

Flemish Beauty.* (Belle de Flandres.) Large, obovate, often obscurely tapering to the crown, very obtuse; surface slightly rough, with some reddish-brown russet on pale yellow ground; stalk an inch and a quarter long, rather slender; cavity round, deep, narrow, often acuminate, rim obtusely rounded; basin small, round; flesh juicy, melting, often with a very rich, sweet, and excellent flavor, but variable, and sometimes not high-flavored; needs house-ripening. Early fall. Shoots dark brown, diverging, and ascending; growth vigorous. The fruit often cracks badly unless the trees are sprayed. Belgium. Fig. 715.

FIG. 713.—Washington. FIG. 714.—Laure de Glymes.

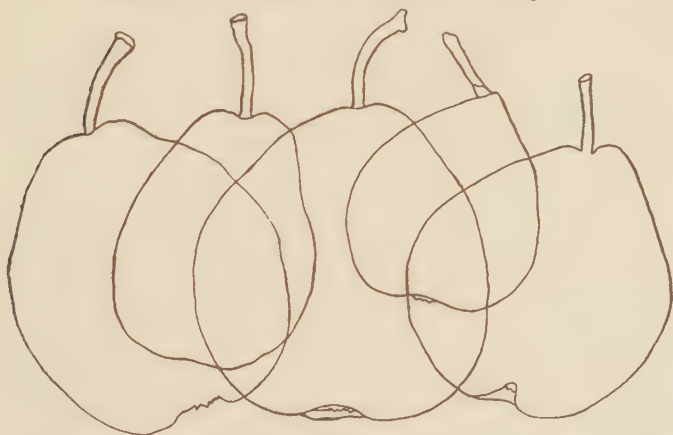


FIG. 715.—Flemish Beauty. FIG. 716.—Howell. FIG. 717.—Gray Doyenné.

Fondante Malines. Medium, roundish-obovate; greenish, netted with russet, becoming rich yellow when ripe; stalk stout, long, curved, scarcely sunk; calyx small, closed; flesh buttery, melting, sweet, perfumed. Late autumn.

Frederick Clapp. Medium large, round-obovate; clear lemon yellow; flesh fine grained, melting, sprightly, rich, aromatic, very good. Mid-season. Excellent for dessert or market. Massachusetts.

Golden Beurre of Bilboa. (Bilboa, Hooper's Bilboa.) Rather large, obovate, slightly pyriform, rather obtuse, very regular; surface smooth, fair, fine yellow, russeted round the stalk; dots small, distinct; stalk an inch and a quarter long, slightly sunk; calyx small, erect, basin shallow; flesh fine grained, very buttery, melting, moderately rich—sometimes an obscure acid astringency. Ripens the first of autumn, and immediately follows the Bartlett. Shoots yellow, ascending. A native of Bilboa, Spain.

Gray Doyenné.* (Doyenné Gris, Gray Butter Pear, Red Doyenné,

Doyenné Rouge, St. Michael Doré.) Size medium, obovate, often approaching turbinate; whole surface a handsome, smooth cinnamon russet; stalk half to three-quarters of an inch long; cavity quite narrow; calyx small, closed; flesh with a very fine texture, very buttery, melting, rich, perfumed, delicious, excellent. Middle of autumn to winter. Shoots yellowish or grayish brown, ascending. Fails by cracking in many localities. France. Fig. 717.

Hagerman. Medium, or small, roundish ovate; yellow, with a brownish-red cheek; stalk short, stout; basin shallow; flesh juicy, melting, quality very good. September. Origin, Long Island.

Hanners. Medium, oblong-obovate; yellowish-green, becoming pale yellow; stalk stout; flesh juicy, melting, very good. September.

Hardy.* Large, long obovate, sometimes obscurely pyriform; skin greenish, with thin brown russet; stalk an inch long, cavity small, uneven, oblique; basin shallow; buttery, somewhat melting, rich, slightly sub-acid, good. October. Tree a strong grower, succeeds well on quince.

Heathcot. (Gore's Heathcot.) Medium size, obovate, regular (Buffum form), base obtuse; surface greenish-yellow, partly overspread with thin russet; stalk an inch long, rather stout; cavity moderate or small; calyx partly closed; basin small; flesh fine grained, buttery, with a rich, perfumed, and excellent flavor—sometimes hardly first-rate. Early mid-autumn. Shoots slender, upright, reddish-brown. Very productive and profitable. Origin, Waltham, Mass. Fig. 672.

Henkel. Medium or rather large, round-obovate, remotely pyriform, with a very short neck, obtuse; surface yellow, often a clear pale yellow, sometimes partly russeted; stalk an inch and a half long, slightly sunk; basin small, even; flesh yellowish-white, buttery, melting, juicy, sprightly, fine, sometimes only second-rate. Shoots long, slender, erect, yellowish-brown; leaves small. Belgian.

Henry IV. (Ananas, Henri Quatre.) Rather small, round-obovate, somewhat turbinate; surface greenish-yellow, often somewhat russeted, sometimes a dark reddish-brown cheek; stalk an inch and a fourth long, slender, usually fleshy at insertion, not sunk; basin shallow, abrupt; calyx closed; flesh juicy, melting, rich, perfumed, mostly first-rate flavor. Needs house-ripening. Early in autumn. Shoots diverging or spreading, yellowish-brown. Very productive. Fig. 679.

Hericart. Medium, obovate, somewhat oblong and irregular, yellow, partly russeted; stalk slender, an inch or more long; cavity small, basin shallow; flesh fine-grained, buttery, often gritty and slightly astringent, not rich, but with a peculiar aromatic flavor. End of September.

Howell.* Rather large, wide-obovate, sometimes with a short obscure neck; light yellow, frequently with a handsome cheek, dots minute; stalk rather long and stout, a little fleshy at insertion, scarcely sunk; calyx in a small, smooth basin; flesh white, melt-

ing, buttery, moderately rich, aromatic, somewhat variable in quality. Tree a strong grower, fruit remarkably fair, mid-autumn. Shoots brown, strong, erect, and ascending. New Haven, Conn. Fig. 716.

Hull. Medium size, obovate, rounded at base; skin yellowish-green, some russeted; stalk an inch and a half long, rather slender, not sunk; basin shallow; flesh melting, juicy, slightly gritty at core, sweet, often fine, sometimes poor. Shoots yellow, diverging, somewhat irregular. Origin, Swansea, Mass. A great bearer.

Jalousie de Fontenay Vendee. (Fontenay Jalousie.) Size medium, conic-turbinate, approaching thick-pyriform; surface a pale dull yellowish-green, more or less russeted, often a faint red cheek; stalk an inch long, often oblique, not sunk; calyx closed, stiff; basin small, round; flesh buttery, melting, mild, rich, fine flavored. Ripens at mid-autumn. Shoots greenish, rather erect, leaves long. French.

Johonnot. Rather small, roundish-obovate, sometimes nearly round, irregular; skin pale greenish-yellow and yellowish-brown, faintly russeted; stalk about an inch long, thick, oblique, fleshy at insertion, not sunk; basin round; flesh rather coarse, melting, buttery, rich, of fine flavor. Early mid-autumn. Origin, Salem, Mass. The value of this fine little pear is lessened by the slow growth of the tree. Shoots reddish, short, diverging.

Jules Bivort. Rather large, obovate, or nearly Doyenné form; skin yellow, thickly dotted, and with much cinnamon russet; stalk long, inclined; cavity broad; basin small; flesh firm, buttery, juicy, very rich, excellent, perfumed. November. Belgian.

Kingsessing.* Large, broad, obovate, or Doyenné form, approaching pyriform; greenish-yellow, thickly dotted; stalk medium or long, curved; cavity broad, uneven; calyx closed; basin shallow, irregular; flesh granular, buttery, melting, with a sweet, very good flavor. September. Shoots rather erect, greenish; leaves recurved. Pennsylvania. A tardy bearer. Fig. 663.

Kirtland. Rather small, roundish-obovate; covered with a rich russet, often reddened in the sun; stalk short, stout, often fleshy at insertion; calyx partly open, basin shallow; flesh buttery, very rich, perfumed, somewhat resembling its parent, the Seckel. Often rots at core, and does not always soften well; requires early gathering. First of September. Ohio.

Laure de Glymes. Medium or large, turbinate, or nearly Blood-good-shaped; whole surface nearly covered with russet, becoming rich orange-yellow at maturity; stalk nearly an inch long, fleshy at base, not sunk; basin shallow, smooth; flesh buttery, high flavored, perfumed, very good. Middle of autumn, sometimes continuing quite late. Belgian.

Lyon. Size medium, Doyenné-shaped; skin yellow, thick, smooth, with a blush, finely dotted, russeted about the stalk; stalk scarcely sunk; calyx nearly closed; basin small; flesh coarse, a little gritty at core, vinous, very good. Resembles Buffum in tree and productiveness, but less dry and two weeks earlier. Newport, R. I.

Moore. (Moore's Pound, Hosenshenck.) Large, obovate or nearly round; skin smooth, green, becoming rich yellow, with a slight blush, thinly and minutely dotted; stalk short, not sunk; basin small, wrinkled; flesh juicy, melting, rich, vinous. Ripens in September, and keeps well. Tree vigorous, productive.

Mount Vernon.* (Walker's Seedling.) Medium, obovate, irregular, dull brownish russet, with a red cheek; stalk very short, oblique, scarcely sunk; basin shallow, smooth; flesh greenish-white, a little coarse, rich, vinous, aromatic. October, November. Roxbury, Mass.

Omer Pacha. Medium, turbinate, smaller specimens roundish-turbinate; skin green, partly russeted around the stalk; juicy, buttery, vinous. First of September.

Oswego Beurre. Size medium, obtuse oval-obovate, regular; surface yellowish-green, with some thin russet; stalk three-fourths of an inch long, stout, deep set; calyx small, erect, or closed; basin smooth; flesh melting, juicy, with a fine, sprightly vinous flavor at first, becoming nearly sweet. Ripens from mid-autumn till winter, often cracks badly. Tree vigorous, hardy, very productive. Origin, Oswego, N. Y.

Petré. Medium size, obovate, sometimes slightly obovate-pyriform or truncate-conic, base or stalk end wide or obtuse; surface pale yellow, often slightly russeted, with a reddish-brown cheek; stalk about an inch long, rather stout, cavity obtuse at bottom; basin small, smooth; flesh fine-grained, sometimes slightly gritty, buttery, melting, rich, sweet, perfumed, often excellent—variable in quality from first to second rate. Ripens at mid-autumn. Growth moderate, shoots rather slender, yellowish.

Philadelphia. Large, roundish-obovate, broad, remotely approaching Diel form; skin yellow, thickly dotted, sometimes partly russeted; stalk stout, cavity abrupt; basin broad, uneven; flesh coarse, buttery, melting, with a very good flavor, slightly perfumed. September.

Preble. Large, oblong, obovate; greenish-yellow, somewhat russeted; stalk an inch long, stout, a little sunk; flesh buttery, melting, with a rich, high flavor. October, November. Maine.

Raymond. Medium, obovate or Doyenné-shaped; skin yellow; stalk an inch long, scarcely sunk; basin shallow; flesh buttery, melting, excellent. September. Maine.

Seckel.* Small, obovate, sometimes obscurely conic-pyriform, regular; skin brownish green, becoming rich yellowish brown, with a deep brownish-red cheek; stalk one-half to three-fourths of an inch long, cavity and basin small; flesh very fine-grained, sweet, very juicy, melting, buttery, the richest and highest flavored pear known. Although of slow growth and small size, like the Green Gage among plums, it is regarded as the standard of excellence. Its high musky perfume is not, however, agreeable to all. Early mid-autumn. Shoots stout, short, ascending; tree very hardy. Needs rich cultivation. Origin, near Philadelphia, Pa., and succeeds well throughout the Northern, Middle, and Western States and is remarkably free from the blight.

Serrurier. (Fondante de Millot.) Medium, conic-obovate, obtuse; yellow, thickly dotted, slightly russeted; stalk rather short; cavity small, basin shallow; flesh slightly granular, juicy, melting, brisk, vinous. September, October.

Shepard. (Shepard's Seedling.) Medium or large, obovate, ribbed toward the crown; yellow, slightly russeted, thickly dotted; stalk an inch long, slightly sunk; calyx erect, basin ribbed; flesh very melting and buttery, of a fine, agreeable flavor. Early October. Dorchester, Mass.

St. Andre. Size medium, obovate-turbinate, crown blunted; skin greenish-yellow, slightly dotted red; stalk an inch long, fleshy at insertion; basin shallow; flesh greenish-white, fine-grained, buttery and melting, perfumed, excellent. September. Bark cracks.

Sterling. Medium or rather large, roundish-obovate, sometimes obscurely pyriform; light yellow, often with a little russet, and a red cheek; stalk long and stout, inserted in a slight cavity by a fleshy ring, basin shallow, uneven; flesh rather coarse, juicy, half melting, good. First of September. The strong upright growth and productiveness of the tree, and the handsome appearance of the fruit, render the Sterling a market variety, although not standing very high in quality. Origin, Livingston County, N. Y.

Superfine.* Medium, roundish-obovate with a small, narrow neck tapering into the stalk; greenish-yellow, somewhat russeted and sometimes a brownish cheek; very juicy and melting, with a rich, agreeable, vinous, and sub-acid flavor. October. Tree vigorous. Grows well on quince. France.

Surpasse Virgalieu. Medium obovate, sometimes roundish-obovate, pale yellow, dots few, minute; sometimes faintly reddened to the sun; stalk medium; cavity moderate, oblique; basin small; flesh white, fine-grained, buttery, melting, high-flavored, excellent.

Tea. Medium, roundish-obovate, approaching pyriform; yellow, numerously dotted; stalk rather stout, cavity small, calyx half closed; basin shallow; flesh white, juicy, melting, vinous, very good. First of September. Milford, Conn.

Thompson. Medium in size, obovate, slightly pyriform; yellow, slightly russeted; stalk an inch long, or less, stout; calyx stiff, scarcely cut; buttery, melting, and fine flavored. Late autumn.

Van Assche. (Van Assene.) Rather large, broad, obovate, slightly angular; crown obtuse, sides rounded; skin fair, smooth, dull yellow; stalk an inch and a quarter long, slender, curved, moderately sunk; calyx closed; flesh white, rather coarse, buttery, melting, rich. Shoots light brownish-purple, diverging; leaves considerably serrated. Belgian.

Vermont Beauty.* Medium, obovate, yellow, bright carmine cheek, russeted; flesh rich and juicy, sweet, very good. Ripens after Seckel. Very hardy. Vermont.

Washington.* Medium in size, oblong-obovate, obtuse, sometimes slightly obtuse-pyriform; surface smooth, clear yellow, handsomely marked with conspicuous red dots on the sunny side, silghtly russeted round the stalk, which is an inch and a fourth

long, and slightly sunk; calyx small, partly closed, basin shallow; flesh very juicy, melting, slightly breaking, with a rich, unusually sweet, perfumed, excellent flavor. Early in autumn. Growth vigorous, shoots brown speckled, straight, erect, and diverging. Fruit always fair, but varies in size and form—esteemed most by those who like a very sweet flavor. Delaware.

Westcott. Size medium, roundish-obovate; green, becoming yellow; flesh melting, juicy, good; not worthy of extension. Early in autumn. Origin, Cranston, R. I.

Wilbur. Medium in size, frequently rather small; obovate, regular, often obovate-pyriform; skin a dull green and russet; stalk three-fourths to one inch long, cavity very small; calyx prominent, scarcely sunk; flesh rather coarse, melting, juicy, pleasant, often slightly astringent, varying. Early autumn. Shoots slender, yellowish-brown. Origin, Somerset, Mass.

Wilkinson. Size medium, obovate, narrowed somewhat toward the crown, largest in the middle; skin smooth, bright yellow; stalk an inch and a quarter long, stout, scarcely sunk; calyx stiff, short, basin shallow; flesh white, juicy, melting, sweet, rich, of good flavor. Ripens from mid-autumn to winter. Shoots long, stout, upright, greenish-yellow; tree thrifty, hard, productive. A good second-rate variety. Often fails by cracking. Rhode Island.

White Doyenné.* (Butter Pear of Pennsylvania, Virgaleu of New York, St. Michael of Boston, Yellow Butter, white Beurré, Doyenné, Doyenné Blanc.) Medium or rather large, regular obovate, obtuse, sometimes remotely pyriform; surface pale yellow, often a faint blush, stalk about an inch long, scarcely sunk; calyx small, basin shallow; flesh of very fine texture, white, buttery, melting, rich, and excellent. Middle to late autumn. Shoots ascending, grayish-yellow; leaves folded, recurved. It fails by cracking in many localities, but in portions of the Western States it is unsurpassed in its excellent qualities of hardy growth, fair fruit, delicious flavor, and great productiveness. France. North of forty-two degrees of latitude, it becomes a late autumn fruit, and may be kept into winter. Fig. 719.

CLASS III. ROUNDISH OR OBLATE.

Church. Size medium, roundish oblate, with a very short neck, irregular; yellow, with minute dots; stalk rather long and stout, scarcely sunk; basin broad and shallow, slightly furrowed; flesh fine, very buttery, melting, with a very sweet, rich, and excellent flavor. Ripens through September. Tree vigorous and spreading, uniformly productive, and fruit unvarying in good quality. New Rochelle, N. Y. Fig. 720.

Des Nonnes. (Beurré de Brignais.) Size medium, roundish-turbinate, obtuse; greenish-yellow becoming clear yellow with many dots, stalk long, rather slender, a little curved, slightly sunk; calyx rather small, often closed in a small wrinkled basin; juicy and exceedingly melting when at perfection, very sweet,

perfumed, with an excellent, delicate flavor. Variable, sometimes quite moderate. September. Fig. 722.

Fulton. Rather small or nearly medium; roundish, crown flattened; whole surface a smooth gray russet, becoming a dark cinnamon russet; stalk an inch and a quarter long, slender, cavity round, rather narrow; calyx long, deep cut, basin uneven; flesh half buttery, melting, rich, sprightly, agreeable, nearly or quite first-

FIG. 718.—Robin.



FIG. 719.

White Doyenné.

FIG. 720.

Church.

FIG. 721.

Sheldon.

FIG. 722.

Des Nonnes.

rate. Ripens middle and late autumn. Shoots rather slender, reddish brown. Tree very hardy and productive. Valuable. Origin, Topsham, Me. Fig. 684.

Gansel Bergamot. (Brocas Bergamot.) Rather large, sometimes only medium; roundish-oblate, more or less approaching obovate, flattened most at crown; skin yellowish-brown, with a faint russet brown blush; stalk short, half or three-fourths of an inch long, ends often fleshy; cavity and basin smooth; flesh granular, melting, juicy, rich, sweet, perfumed, with a very good flavor. Ripens through several of the early weeks of autumn. Shoots short, dark gray, spreading; leaves flat, mealy. English. Fig. 683.

Goubalt. Rather small or medium, roundish-oblate, with a slight neck; greenish-yellow; stalk long, cavity small, calyx large; basin shallow; juicy, not high-flavored. September. Tree vigorous, an early and great bearer. Fig. 682.

Huntington. Size medium, roundish, approaching obovate; yellow, rough, sometimes shaded crimson, slightly russeted, thick, dotted; stalk medium or long; cavity broad, uneven, basin mo-

erate; flesh white, juicy, buttery, and melting, sweet, perfumed excellent. Last half of September. Origin, New Rochelle, N. Y.

Idaho. (Mulkey.) Large, nearly round, regular; golden yellow, many russet dots; cavity irregular, rather deep; basin shallow, pointed; flesh melting, juicy, sprightly, vinous, very good. Early autumn. Idaho. Fig. 725.

Merriam. Rather large, roundish, approaching oblate; rich yellow, partly russeted; stem short, cavity small, calyx closed; basin shallow, furrowed; flesh rather coarse, juicy, melting, perfumed, very good. Middle of autumn. Popular at Boston.



FIG. 723.—Stevens' Genesee. FIG. 724.—Le Conte. FIG. 725.—Idaho.

Robin. Size above medium, round, nearly regular, or obscurely and obtusely ribbed; skin pale yellow, usually russeted about the crown; stalk an inch and a half long, generally set in a rather deep, smooth cavity, sometimes merely planted on the surface; calyx in a smooth or scarcely furrowed basin; flesh buttery, melting, with a fine, "very good" flavor. Shoots brownish-green, rather erect. Fig. 718.

Roe's Bergamotte. Medium, oblate, irregular; skin yellow, reddened to the sun; stalk short, cavity narrow, abrupt; calyx small, basin narrow; flesh rather coarse, sweet, rich, perfumed. September. Shoots dark reddish brown, diverging, leaves small, somewhat curled. Newburg, N. Y.

Sheldon.* Medium or large, roundish, sometimes approaching broad obovate; greenish-russet becoming cinnamon brown; stalk short, cavity narrow; basin smooth, rather deep; flesh a little coarse, very melting, juicy, with a very brisk, vinous, excellent

flavor. October. Tree vigorous, shoots ascending, yellowish-brown. It requires double working on the quince. New York. Fig. 721.

Stevens' Genesee.* Large, round-obovate, often considerably flattened; skin slightly rough, yellow; stalk an inch long, stout, thickest at insertion, more or less sunk in the base; calyx short, stiff, basin smooth; flesh moderately fine-grained, half buttery, slightly granular, with a rich, very good flavor. Ripens the first of autumn and for some time afterward. Rots at core when not gathered early. Shoots gray, leaves narrow. Origin, Livingston County, N. Y. Fig. 723.

DIVISION III.—WINTER PEARS.

CLASS I. DISTINCT PYRIFORM.

Aremburg. Medium or large, short pyriform, sometimes approaching conic-obovate, neck rather small; skin thick, greenish-yellow, partly russeted; stalk short or half an inch to an inch long, thick, oblique, thickening with flesh toward insertion; calyx erect; basin deep, narrow; flesh buttery, melting, rich, sub-acid, variable. Often too astringent. November and December.

Bachelier and Dumas, described among autumn pears, pages 516 and 519, often keep into winter and become winter varieties.

Barry.* Large, long pyriform; skin orange-yellow, covered with russet dots and blotches; flesh juicy, buttery, rich, best. Resembles Anjou in texture and Winter Nelis in color. Tree a poor grower and must be double worked. Late winter. One of the best winter varieties, extensively grown in California for Eastern markets. It has there supplanted Nelis to some extent. California.

Black Worcester. (Iron Pear, Black Pear of Worcester.) Large pyriform (Diel-shaped), sometimes approaching oblong-ovate; surface mostly covered with dark rough russet on a light green surface; stalk half an inch to an inch and a half long; cavity none; calyx erect, basin small; flesh hard, coarse, rich, somewhat austere; stews and bakes well. An esteemed culinary sort, bearing heavy crops, and proving profitable for market. Late autumn till midwinter. Growth very crooked and straggling. Fig. 655.

Catillac. Large, short, conic-pyriform, approaching broad-turbinate; crown broad, flattened; yellow, often with a reddish-brown cheek; stalk an inch to an inch and a half long, stout, cavity small, wavy; calyx short, erect, or spread, basin large, plaited; flesh hard, but excellent for baking and stewing, becoming tender, and of a light red color. Keeps through winter. French.

Chaumontel. (Bezi de Chaumontelle, Winter Butter.) Large, pyriform, body oblong or ovate, neck short, obtuse, often quite obscure, and the form approaching obovate or oblong—largest at the middle; skin a little rough, yellowish in the shade, with more or less brownish-red, and rich deep red in the sun; stalk an inch long, moderately sunk; basin deep, uneven, or angular; flesh

buttery, melting, sugary, with a fine flavor. Requires warm, rich cultivation to develop its good qualities, often poor. Shoots long, slender, dark brown. Grows well on the quince. Early winter. Old French.

Clairgeau.* Large, pyramidal-pyriform, approaching long obovate, skin yellow or yellowish-brown, often with a crimson shade toward the sun, and brown dots; stalk short, stout, fleshy, oblique, sunk little or none; basin shallow, furrowed; flesh white, slightly granular, buttery, melting, often with a rich, very good flavor, but frequently poor. November, December. Shoots reddish-purple, short, erect, and ascending; leaves stiff. Fig. 727. France.

Colmar. (Colmar Souverain, Colmar Hardenpont, Colmar Gris.) Medium or rather large, distinct pyriform; skin yellowish-green, becoming pale yellow, often lightly sprinkled with russet; stalk an inch and a quarter long, cavity obtuse or none, calyx erect, basin moderate; flesh fine-grained, buttery, juicy, sweet, rich, and when well grown and ripened of excellent, first-rate flavor—but if

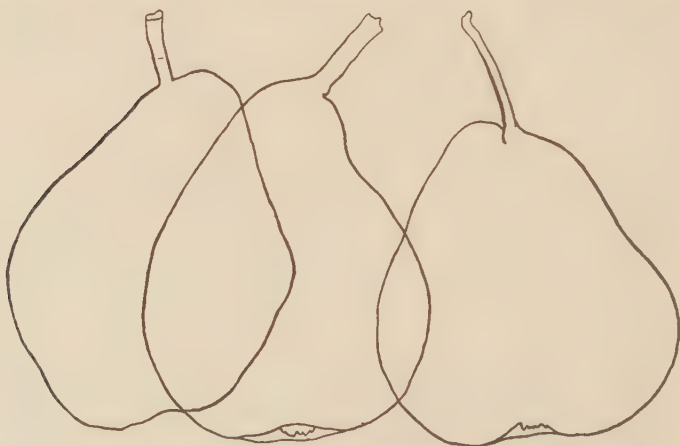


FIG. 726.—Glout Morceau. FIG. 727.—Clairgeau. FIG. 728.—Colmar.

small and badly matured or overloaded trees, the quality is worthless. The tree overbears, and the fruit needs thorough thinning. Leaves rather small, nearly flat. Early winter. Belgian. Fig. 728.

Fondante de Noel. (Belle Apres Noel.) Medium or rather small, obtuse-pyriform; pale greenish-yellow, with a red cheek; stalk long, stout, curved, oblique; calyx closed; basin broad, shallow, irregular. Shoots greenish yellow, growth resembles Passe Colmar; flesh whitish, melting, juicy, very good. A seeding of the Passe Colmar, ripening earlier, and of similar flavor—a fine late autumn and early winter sort. Belgian.

Glout Morceau.* (Gloux Morceaux, Beurré d Hardenpont, Colmar d'Hiver, Hardenpont d'Hiver, Linden d'Automne.) Large, short, pyriform, approaching obtuse-oval, neck very short and obtuse, body large, and tapering somewhat toward the crown; often considerably ribbed; surface green, becoming pale greenish-yellow; stalk an inch and a fourth long, stout, moderately sunk; calyx large, basin distinct, rather irregular; flesh white, fine-grained, buttery, melting, rich, sweet, and of fine flavor. Early winter. Succeeds best on the quince. Shoots spreading, greenish; leaves wavy or wrinkled. Variable, sometimes poor, best on trees of several years' bearing; excellent when fully grown and well ripened. Fig. 726. Belgium.

Goubalt. Rather large, roundish-pyriform, approaching roundish-obovate, pale dull yellow, russeted at stalk and calyx; stalk short, thick, calyx small, deeply sunk; melting, juicy, rich, aromatic. December to February. Shoots greenish yellow, slightly purple, a slow grower. Fig. 682.

Inconnue Van Mons. Small, conic-pyriform (Madeleine-shaped), approaching obovate; skin rough, green, becoming yellowish, sprinkled with russet; stalk rather long, curved, slightly sunk; basin small; flesh granular, juicy, melting, rich. Early winter. Fig. 668.

Jaminette. (Josephine.) Medium or rather large, obovate-pyriform, approaching obovate, small specimens roundish-turbinate, varying; crown broad; skin yellowish-green, with some brownish-russet, dots numerous, often confluent; stalk three-fourths to an inch long, thick; cavity little or none; calyx small, erect, stiff; basin round, even, flesh juicy, melting, buttery, sweet, of good flavor. Late autumn and early winter. Shoots somewhat reddish-green, erect, diverging. Origin, Metz, in France. A very strong grower on the quince.

Langelier.* Size full medium, pyriform or Urbaniste-shaped; pale yellow, slightly russeted; stalk short, cavity small; basin somewhat irregular; flesh juicy, buttery, melting, with a sweet, rich, slightly vinous flavor. Early winter. Tree a good grower on pear and quince. A light bearer on young trees. Shoots greenish, often upright, irregular; leaves broad. Fig. 665. England.

Las Canas. Size medium, regular pyriform, somewhat conic (Tyson-shaped); neck tapering into the stalk; skin yellow, sometimes sprinkled with thin russet, rarely with russet blotches, dots small and numerous; stalk an inch long; calyx slightly sunk; flesh juicy, often good. Fig. 657.

Lawrence.* Size medium, pyriform, approaching obovate, somewhat uneven; lemon-yellow with numerous small dots; stalk an inch long, set in a small basin, ribbed; flesh whitish, buttery, with a rich, aromatic, very good flavor. December. Growth moderate, spreading. Shoots yellowish-green. An early and good bearer, and unexcelled as a valuable early winter sort. It ripens easily, and is of uniform excellence. Fig. 736. New York.

Lycurgus. Small, pyriform, approaching obovate, narrowing off to the crown; dark, dull green, rough, russeted; stalk short, slender.

twisted, not sunk; calyx large, slightly sunk; flesh greenish-white, a little coarse, rich, very high-flavored. December. A supposed seedling of the Seckel.

McLaughlin. Large, pyramidal-pyriform, often roundish-obovate when small; skin rough, partly russeted, greenish, becoming yellow; stalk short, oblique, not sunk; basin shallow; flesh juicy, melting, sweet, rich, perfumed. Early winter. Maine.

Pater Noster. Large or medium, pyriform approaching pyramidal, somewhat irregular; yellow, often russeted, sometimes with a red cheek; stalk an inch long, fleshy at insertion, scarcely sunk; basin narrow; flesh buttery and melting, fine-grained, rich, slightly sub-acid, often a little astringent. Early winter. Shoots short, greenish-purple, erect. Often ripens wholly in autumn.

Pound. (Winter Bell, Uvedale's St. Germain, Angora.) Very large, pyriform, crown wide; skin yellowish-green, with a brown cheek; stalk two inches long, calyx crumpled, basin narrow; flesh solid, hard, poor, stems reddish color; a good culinary pear. Tree strong, healthy, productive. Shoots stout, upright, dark. Europe. Fig. 651.

Reading. Rather large, pyriform, regular, tapering somewhat to the crown, often ribbed; thickly dotted and slightly russeted, on a greenish-yellow skin; stalk long, curved, enlarged at insertion, slightly sunk; basin little or none; flesh granular, rather melting, juicy, vinous, pleasant, good. January, and later. Shoots brownish-olive, rather erect, long, slender. Pennsylvania.

St. Germain. Large, long pyriform, small specimens obovate; surface yellowish-green, faintly tinged with brown to the sun; stalk an inch long, oblique; basin small and shallow; flesh white, slightly gritty, juicy, melting, sub-acid. Fails in many localities, and becomes a poor fruit. Late autumn and early winter. Shoots slender, light olive, leaves narrow, folded, and recurved. The striped St. Germain is a sub-variety, differing only in its faint yellow stripes.

Suzette de Bevay. Rather small, obovate-pyriform, inclining to conic; dull yellow, dots minute; stalk long, curved, basin shallow, uneven; flesh melting, vinous, perfumed. January to March. Belgian.

Vicar of Winkfield.* (Le Curé, Monsieur le Curé, Clion.) Quite large, long pyriform, with a conical taper toward the crown; skin smooth, pale yellow, or pale yellowish-green, with a dull reddish cheek; stalk an inch to an inch and a half long, slender, often fleshy at insertion, oblique, not sunk; basin narrow, very shallow; flesh greenish or yellowish-white, juicy, buttery, with a moderate flavor—sometimes slightly astringent. Ripens late autumn and early winter, for about two months. Growth spreading and irregular, or straggling; shoots strong, dark olive. Grows well on quince stocks. The great and uniform productiveness of this pear, its fine qualities for cooking, and the long period of its continuance, render it valuable. France. Fig. 646.

Willermoz. Rather large, pyriform, elongated toward the crown; skin rough, green, becoming yellow, dull red to the sun; stalk one inch long, not sunk; basin moderate, rather distinct; flesh rather coarse, granular, buttery, somewhat acid, often astringent—variable. Early winter. Shoots greenish-purple, diverging; leaves dark green. Often ripens in autumn.

Winter Nelis.* (Nelis d'Hiver, Bonne de Malines.) Size rather small or medium, roundish-pyriform, often obovate, neck small and short; surface yellowish-green, much russeted; stalk an inch and a quarter long, bent; cavity narrow; calyx stiff, short; basin shallow, ribbed; flesh yellowish-white, fine-grained, buttery, very melting, rich, sweet, or slightly vinous, perfumed, aromatic, with an excellent flavor. Early winter. Growth slender, flexuous, and straggling; leaves narrow, recurved; petioles rather long. Origin, Mechlin, in Belgium. Fig. 737.

CLASS II. OBSCURE PYRIFORM, OBOVATE OR TURBINATE.

Alençon. (Doyenné d'Hiver Nouveau, Doyenné Gris d'Hiver Nouveau, St. Michael d'Hiver.) Medium, obovate, approaching pyriform when large, skin rough; yellow, with russet or brown dots; stalk medium, stout, moderately sunk, basin deep; flesh somewhat granular, buttery, juicy, rich, sprightly. December to April. Although not of the highest flavor, this pear is one of the most valuable and reliable of good-keeping winter pears.

Alexandre Lambre. Size medium, roundish-obovate; yellowish-green marbled with red toward the sun; stalk stout, not sunk; basin shallow; flesh juicy, melting, sweet, rich, sometimes very good, frequently poor. November, December. Shoots slender, yellowish, spreading.

Anjou.* Commences ripening in autumn. See Autumn Pears.

Brande's St. Germain. Size medium, obovate, often considerably pyriform, narrowing to both ends, smooth and regular; skin yellowish-green, thickly dotted with large russet specks; stalk an inch long, thick, obliquely set; calyx small, stiff, erect; basin small, narrow, often none; flesh buttery, melting, yellow toward the core, with a pleasant, slightly acid, good, or very good flavor. Early winter. English.

Columbia.* (Columbian Virgalieu, Columbia Virgouleuse.) Large, long obovate, regular, handsomely rounded or obtuse, largest nearest the middle; surface pale green, becoming pale yellow, always smooth and fair; stalk an inch and a quarter long, rather slender; cavity narrow, deep; calyx erect, basin small; flesh white, melting, and buttery, of moderately rich flavor. Ripens early winter. Growth upright, vigorous, shoots brownish yellow. The large, handsome fruit, and the great productiveness of the tree, have rendered this variety popular and profitable for market, although not high in quality. It does not appear to succeed so well as far north as Boston or Rochester as farther south. A native of Westchester County, N. Y.

Coter. Size medium, obovate, obscurely pyriform, nearly regular; light yellowish-green, brown in the sun, somewhat russeted; stalk an inch long, without cavity; segments of the calyx distinct and widely reflexed; basin round, moderate; flesh white, rather coarse, buttery, rich, slightly perfumed, very good. Late autumn. Belgian.

Dana's Hovey.* Rather small, obovate, slightly pyriform; rich yellow, with some cinnamon russet; stalk medium, slightly sunk, basin shallow; flesh buttery and melting, of excellent quality. December. Shoots stout, erect. **Massachusetts.**

Easter Beurré.* (Doyenné d'Hiver, Bergamotte de la Pentacôte, Beurré de la Pentacôte, Beurré de Pâques, Chaumontel très gros, Canning Seigneur d'Hiver.) Large, obovate, approaching oval; surface yellowish-green, with some russet; often a broad, dull reddish cheek; stalk stout, an inch long; cavity deep, sometimes

FIG. 729.—Josephine de Malines.

FIG. 730.—Sieulle.

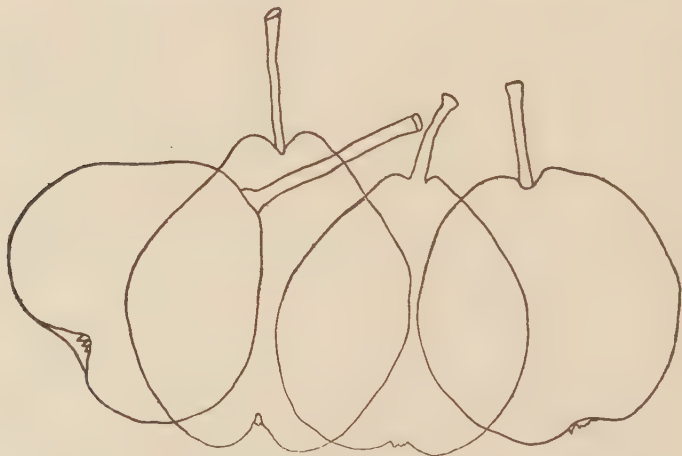


FIG. 731.—Kieffir. FIG. 732.—Koonce.

obtuse, abrupt; calyx small, closed in a moderate or rather shallow, plaited basin; flesh fine-grained, very buttery, melting, and juicy, and when well grown and ripened, of excellent flavor. It does not often mature well in the Northern States. Keeps through winter. Growth moderate, rather upright, shoots reddish-yellow; leaves narrow, folded, recurved. Grows best on the quince. Europe. Fig. 735.

Grand Soleil. Rather small, roundish-obovate, irregular, and varying, mostly covered with a rich russet; calyx small, closed; flesh yellowish-white, a little coarse, buttery, melting, aromatic, very rich. November and December. Belgian.

Gris d'Hiver.* (Beurré Gris d'Hiver Nouveau, or "Gray Winter Beurré.") Size medium, obovate, or short Doyenné-form, obtuse; skin greenish, considerably russeted; stalk thick, short, cavity moderate, basin small; flesh greenish, buttery, melting, very juicy, rich, slightly sub-acid—resembling in flavor the Beurré d'Arenberg, but rather richer and less acid. Early winter. Shoots purplish-red, leaves curled. French. Fig. 677.

Jean de Witte. Size medium, flattened, obovate; stalk short, slightly sunk; basin small, calyx closed; skin yellowish green, partly russeted; flesh white, juicy, melting, sweet, rich. December.

Jones. (Jones' Seedling.) Size medium or small, Bloodgood-shaped, or obovate, remotely pyriform; surface rich yellow russet; stalk an inch or an inch and a fourth in length, variable in thickness, fleshy at insertion, not sunk; basin shallow; flesh yellowish, melting, of fine flavor. Ripens late autumn and early winter. Shoots diverging and ascending. Origin, Kingsessing, near Philadelphia. Productive and valuable. Fig. 733.

FIG. 733.—Jones' Seedling. FIG. 734.—Gregoire.



FIG. 735.—Easter Beurré. FIG. 736.—Lawrence. FIG. 737.—Winter Nellis.

Kieffer. Tree remarkably vigorous and very productive; fruit large to very large, oval, narrowing toward both ends; skin rich yellow, with a handsome red cheek in the South; flesh usually somewhat coarse, juicy, good to poor. Late fall to late winter. A cross between Bartlett and the Chinese Sand Pear. The beauty, vigor, and productiveness of this variety have established it as the most popular market variety of the country. It is excellent for canning, and is grown largely for that purpose. Unless properly ripened the quality of the fresh fruit is low; but if ripened slowly in a dark place it develops a good flavor.

In some sections it fruits sparingly in large blocks unless another variety is intermingled. Wonderfully popular with growers and canners, but consumers are finding that it generally lacks flavor. Beautiful to look at but insipid. **Fig. 731.**

Lewis. Size below medium, regular obovate, rarely obscure pyriform; surface yellowish-green, thickly dotted with dull russet; stalk an inch and a half long, slender, scarcely sunk; calyx widely reflexed, basin little or none; flesh greenish-white, melting, juicy, of fine, rich flavor. Core large. Early winter. Growth vigorous, branches becoming drooping. Profusely productive. Origin, Roxbury, Mass.

Prince Germain. Size medium, obovate, obtuse; surface much russeted on green, dull red to the sun; stalk an inch and a fourth long, cavity small; calyx large, stiff, slightly cut, basin smooth, shallow; flesh yellowish-white, juicy, melting, slightly vinous, with an agreeable and fine flavor. Keeps well, ripening through winter. Origin, Flushing, L. I.

Vicomte de Spoelberch. (De Spoelberg, *Delices Van Mons*.) Medium or rather large, obovate, somewhat conic; skin slightly rough, yellow, with a purplish blotched cheek to the sun, very slightly russeted; stalk an inch and a fourth long, stout, curved, basin round, shallow; calyx erect, short; flesh buttery, melting, rich, fine. Needs high cultivation to develop its fine qualities. Early winter. Belgian.

Zephirin Gregoire. Medium, turbinate, Bloodgood-shaped; light green becoming yellow, reddened next to the sun; stalk one inch long, fleshy at base; basin narrow; flesh white, buttery, melting, fine-grained, excellent, perfumed. November to February.

CLASS III. ROUNDISH OR OBLATE.

Cross. Medium in size, roundish; surface yellow, often with a red cheek, and some russet; stalk three-fourths of an inch long, very thick, set shallow; calyx small, rather deeply sunk; flesh melting, juicy, with a rich, high, fine flavor. Early winter. Shoots rather slender, a poor grower—of little value. Massachusetts.

Josephine de Malines.* Size medium, conic-oblate; yellowish with small dots; stalk very long, cavity slight, basin large; flesh of a light salmon color toward the centre, buttery, of a sweet and peculiar flavor. The tree forms a handsome pyramid on quince. This is one of the best early winter pears, often keeping till midwinter and later. Belgian. **Fig. 729.**

Sieulle. (Beurré Sieulle, Doyenné Sieulle.) Medium in size, roundish-oblate, often roundish-obovate, with a very short, obscure neck, obtuse; skin pale yellow, with a slight blush, and sometimes a brilliant broad orange cheek; stalk thick, an inch and a quarter long; cavity shallow, rarely deep; calyx slightly sunk; flesh buttery, fine-grained, rich, of good, often of excellent quality. Ripens late in autumn, and keeps to midwinter. Variable, uncertain. **Fig. 730.**

CHAPTER XXXI.

PLUMS.

IN no branch of pomology has greater progress been made the past twenty years than in the improvement and development of our native plums and in the introduction of foreign varieties. The bringing in of the Japanese plums marks an era in fruit culture in the United States.

The number of new sorts of plums which have been added to the list under cultivation makes it necessary, for their intelligent selection and propagation, to amplify the classification of the varieties of this fruit from the simple division according to color, to one more scientific and accurate. The study and published conclusions of such leading investigators as Bailey, of Cornell University, Goff, of Wisconsin, Waugh, of Vermont, Craig, of Iowa, and Mr. Berckmans, of Augusta, Ga., have made this a comparatively easy matter.

PROPAGATION.

Seedlings.—As with most fruits, plums rarely come true from seed, although some varieties vary but little from the parent stock.

The stones should be selected from the choicest kinds and treated in planting precisely as directed for the peach, but greater care must be exercised to prevent their drying, which occurs much in consequence of their smaller size and thinner skin. It is better to crack them, without which many will not vegetate the first year.

Stocks.—The stocks heretofore used for growing plums have generally been seedlings of European type (especially the Myrobalan or cherry plum), which when the varieties of the European plums do well are usually satisfactory, although upon light or unfavorable soils they are apt to produce feeble and slowly growing seedlings. For the Southern States the peach stock is generally used, and in the Northern States and throughout the country generally seedlings of the best of the

Americana group, in consequence of their greater hardiness, are perhaps most desirable. The Myrobalan is extensively used in the North. Marianna is used in the South, since it grows readily from cuttings. The best stock for plums is a confused subject.

Grafting and Budding.—Crown grafting is recommended by some experimenters and growers. The scions should be cut in the fall, three or four buds to each (see pages 30 and 31, for direction for keeping through the winter). Put in the scions early in the spring before there are any signs of the buds starting.

Budding must be performed while the stocks are at the period of their most vigorous growth, provided sufficiently matured buds can be found, which is usually soon after mid-summer. If deferred, the bark will not peel freely, and the buds will not adhere.

CULTIVATION.

Soil.—The best soil, usually, is a strong, rich, clayey loam. On many light soils the tree grows with less vigor, independently of which the crop is more frequently destroyed by the curculio, a pervious soil affording a more ready place of shelter for the young insects, on their escape from the fallen fruit. A few varieties are well adapted to rather dry as well as light lands. Applications of potash and ground bone, as usual with other fruits, is of advantage in increasing the fruitfulness of the plum.

In planting orchards, a suitable distance is one rod apart, giving one hundred and sixty trees to the acre. The ground should be manured and kept well cultivated, as the plum, especially when young, is sensitive to the effects of the weeds and grass of neglected culture.

Impotency.—It is well known that some of the native varieties are so deficient in fertile pollen, that they are almost incapable of fertilizing themselves. It is therefore advised that all plantations of them be planted of two or more varieties, alternating the rows.

CLASSIFICATION.

With but comparatively few exceptions the varieties of plums grown in gardens, and for commercial purposes, may be included in five groups. As this work aims to be of a practical rather than scientific character, these only will be considered. They are

NATIVE PLUMS.

I.

The Americana Group—Prunus Americana.

Comprises a class of hardy, vigorous young trees, the wild forms of which are found growing throughout the Northern States. The fruits differ widely in all their characteristics.

II.

The Wild Goose Group—Prunus hortulana.

This class has heretofore been included in the Americana, but it has recently been separated by Professor Bailey into an independent group, and includes the Miner type.

III.

The Chickasaw Group—Prunus angustifolia.

It is found growing wild in the Southern States.

IV.

The European Group—Prunus domestica.

Most of the finest plums which have been cultivated in the United States until quite recently belong to this class. They are all of European or Asiatic origin. Except in certain localities they are invaluable. The Myrobalan is very closely allied, and is much used for stocks.

V.

The Japanese Plums—Prunus triflora.

These fruits were imported into the United States about twenty-five years ago, and have grown steadily in popularity. They are generally of large size, brilliantly colored, and variable in quality. Many seedlings and hybrids from this stock are being introduced. They are not all equally adapted for all sections of the country. Some are not hardy North, some bloom too early, and others do not do so well in the Southern States as farther North.

AMERICAN GROUP—PRUNUS AMERICANA.

DIVISION I. RED, PURPLE, OR BLUE.

American Eagle. Very large, roundish-oblong; purplish red, cling, good. Early. Missouri.

Beach Plum. Small, round; dark purple, covered with bloom; flesh brittle, juicy, sweet, freestone. Grows wild on the sand dunes of the coast from Maine to Virginia. It is a straggling bush, usually three to five feet high. Commonly gathered to preserve. Ripens in August. Fruit of little value. It is *Prunus Maritima*. Fig. 738.

Beaty. Large, round-oblong; red, purple; flesh firm, good, cling. Texas.

Cheney.* Large to very large, round-oblong; dull purple red; skin thick; flesh firm, sweet, good, cling. Ripens in August. Wisconsin.

Chippeway. Small, oblong; dark red; skin thick; flesh firm, sweet, free.

Cottrell. Large, round-oblong; red, skin thin; flesh rich, good, cling. Minnesota.

Deep Creek.* Medium, round-oblong, flattened, sutured; dull purple-red, glaucous; skin thick; flesh firm, very sweet, good, free; stalk short. Kansas.

De Soto.* Medium to large, round-oblong, slight suture; red, slight purplish bloom; skin thick; flesh orange color, firm, juicy, good, cling. Mid-season. Wisconsin.

Hawkeye.* Large, round-oblong; purple-red; skin thick; flesh firm, good, cling. Mid-season. Iowa.

Illinois. Large, oblong, dark red; skin thick; flesh firm, cling. Mid-season. Illinois.

Itaska. Medium, oblong, purple-red; skin thick; flesh firm, cling. Tree dwarf, strong grower, handsome. Minnesota.

Lendloff. Small, flattened, oblong; deep red-mottled; skin thick; flesh firm, sweet, good, nearly free. Minnesota.

Louisa. Large, round; dark red; thick skin; flesh firm, good, semi-cling. Varies in appearance in different localities. Mid-season. Missouri.

New Ulm. Very large, round-oblong; dark red; skin moderately thick; flesh firm, good, cling. Late. Minnesota.

Peffer. Medium, round, red; skin thick; flesh firm, good, cling. Mid-season. Wisconsin.



FIG. 738.—Beach Plum.

Quaker.* Large, round-oblong, flattened; purple-red, orange on side, blue bloom; skin thick, astringent; flesh firm, sweet, juicy, semi-cling, very good. Early. Requires good cultivation and thinning.

Rollingstone.* Large, round, flattened, truncated at ends; mottled and spotted pink-purple; flesh firm, sweet, good, semi-cling. Mid-season. A very popular Western plum. Minnesota.

Surprise. Large, oval, dark red, meaty, very good to best. Medium early. Bears well and sells well. Promising. Minnesota.

Weaver.* Medium, oblong, flattened, dark-red purple bloom, distinct suture, free, good canning plum. Mid-season. Iowa.

Wier. Large red, medium, round, red; skin thin; flesh moderately firm, good for cooking. Illinois.

Wyant.* Medium, round-oblong; purplish-red; skin thick; flesh firm, free. Iowa.

Yosemite. Very large, round; red purple; skin thick; flesh firm, cling. Mid-season.

DIVISION II. GREEN, WHITE, OR YELLOW.

Forest Garden.* Large, round-oblong; orange-yellow, overlaid and dotted red; skin medium, thick; flesh moderately firm, orange color, fibrous, juicy, good, cling; stem slender, short. Tree forked and inclined to split. Not good east of Illinois. Good for home use. Mid-season. Iowa.

Gaylord. Large, round-oblong, slightly flattened; orange, mottled red; skin thick; flesh soft, sweet, semi-cling. Late. Iowa.

Ida. Medium, round; yellow, covered dull red; flesh firm, salmon color, very sweet, free. Tree sprawling, thorny. Illinois.

Iona. Large, oblong; dull yellow with red cheek; skin thick; flesh firm, yellow, sweet, free. Mid-season. Wisconsin.

Le Duc. Medium, round, flattened; orange, spotted red; skin thin; flesh soft, sweet, semi-cling. Mid-season. Minnesota.

Mussey. Large, round-oblong; yellow, mottled red; skin thick; flesh firm, good, semi-cling. Very late. Kansas.

Ocheeda. Large, round; yellow and red; skin thin; flesh firm, good, semi-cling. Mid-season. Minnesota.

Rockford.* Medium, oblong-oval, yellow overlaid with dark red; skin thick flesh meaty, dryish, of very good quality. Iowa.

Speer. Medium, oblong; mottled orange and red; skin medium, thick; flesh firm, sweet, semi-cling. Iowa.



FIG. 739.—Wolf.

Stoddard.* Medium to large, round; skin thick, not bitter, yellow, nearly covered with dark red; flesh yellow, juicy, sweet, good. Quite similar to Hawkeye, but earlier and a darker red. Valuable. Iowa.

Van Buren. Medium, round-oblong, yellowish-red; skin thick; flesh yellowish, tender, sweet, free. Mid-season. Iowa.

Wolf.* Medium large, round; yellow mottled red; skin thick; flesh yellow, firm, fibrous, good, free. Mid-season. Tree strong grower, prolific. Good for home and market. Iowa. Fig. 739.

Yellow Sweet. Medium, round-oblong, flattened; orange mottled pink, purple; skin thin, free. Minnesota.

WILD GOOSE GROUP—PRUNUS HORTULANA.

DIVISION I. RED, PURPLE, OR BLUE.

Forest Rose. Large, round; dark red, with slight bloom; cling. Tree vigorous and productive. Missouri.

Miner.* (Old Hickory, General Jackson, William Dodd, Chickasaw Chief, Hinckley, Isabel, Gillett, Townsend, Robinson, Parsons.) Large, round, pointed apex; dull purple-red, many minute yellow-gray spots; skin thick, blue bloom; flesh pale amber, soft, juicy, vinous, rich, cling; defective fertilizer; fruit should not be gathered until well colored. Late. Tennessee.

Prairie Flower.* Medium, roundish, slender stem; dark purple-red, many small yellow specks, slight bloom; flesh yellow amber, juicy, sweet, cling. Mid-season.

Poole. (Poole's Pride.) Medium, round-oblong; red with bloom, sweet, good, hardy, prolific.

Wayland. Large, round-oblong; light red; skin medium thick and shiny.

Very late, good for Southern States. Kentucky. Fig. 740.

Whitaker.* Medium to large, roundish, red, of good quality. Season early. A seedling of Wild Goose, originated by J. T. Whitaker, Texas. One of the best.

Wild Goose.* Medium, round; bright light red; skin thin, shiny; flesh yellow, pulpy, cling, very sweet and juicy when fully ripe. If left to hang on the tree until it drops off it is too soft for shipping. It is advised to pick them three or four days before ripening and ripen in the house. Popular variety, a poor self-fertilizer; should have other plum-trees with abundance of pollen planted near it. Tree like a peach, prolific. Tennessee.



FIG. 740.—Wayland.

DIVISION II. GREEN, WHITE, OR YELLOW.

Garfield. Medium, round-oblong; dark red, yellow specks; skin thick; stem one inch; flesh orange-yellow, juicy, acid. Late. Ohio.

Golden Beauty.* Medium, round-ovate, pointed at apex; deep clear yellow; skin thick; flesh amber, firm, sweet, semi-cling. Late in blooming and in ripening. Does not ripen in the North. Tree hardy, vigorous, productive. Texas.

Milton.* Medium, globular to oblate, dark red; stone ovate cling; flesh firm, apricot flavor, good. Seedling of Wild Goose. A valuable variety. Iowa.

Missouri Apricot. Medium, round; deep yellow; skin moderately thick; semi-cling.

CHICKASAW GROUP—PRUNUS ANGUSTIFOLIA.

DIVISION I. RED, PURPLE, OR BLUE.

Brunswick. Medium, round, pointed apex; dark red, white bloom; flesh yellow, sweet.

Emerson Early. Medium, round; purple red; skin thin, cling. Very early. Texas.

Hoffman. Medium, round, purple-red. Mid-season. Very prolific. Ripe in Northern Texas middle of July. Texas.

Newman.* (Warren.) Medium, nearly round; pink-red, light spots near apex. Only fair quality. Mid-season. Kentucky.

Pottawattamie. Medium, round; red, streaked yellow; stem long, slender; flesh firm, very juicy, of fair quality. Very productive. Mid-season. Tennessee.

Robinson. Small, round; red, many light yellow spots; flesh amber, juicy, cling. North Carolina.

DIVISION II, GREEN, WHITE OR YELLOW.

Priam. Medium, round; yellow, skin thin. Very productive. Texas.

Wooten. Large, round-oblong; yellow, blotched red. Ripe in Texas in July. Sure bearer. Texas.

Yellow Transparent.* Medium large, oblong, lemon yellow. Early Texas.

EUROPEAN GROUP—PRUNUS DOMESTICA.

DIVISION I. RED, PURPLE, OR BLUE.

Archduke.* Large, round-oval, dark purple; flesh firm, quality good. Hangs on the tree a long while. An excellent late market sort. England.

Blue Imperatrice. (Imperatrice.) Size medium, obovate, narrowed to the base in a somewhat conic neck; skin deep purple, bloom copious, blue; stalk three-fourths of an inch long, slightly



FIG. 741.—Bradshaw.

sunk; flesh greenish-yellow, rather firm, not juicy, rich, sugary; ripening very late, and hanging till nearly winter.

The variety known erroneously as the *Semiana* or *Blue Imperatrice* of Boston, and disseminated as such, differs from the true *Imperatrice* in its shorter and smaller neck, much shorter and not sunk stalk, and more acid flavor. It is very productive, and a good very late culinary sort.

Beauty of Naples. Medium, round, sides uneven; stem half-inch, purple, slight bloom, many yellow specks; flesh yellow amber, tender juicy, sweet, semi-cling. Productive.

Bradshaw.* Very large, obovate, with an obtuse suture on one side, sometimes with a very slight neck; color dark purple, with a light blue bloom; stalk three-fourths of an inch long, cavity narrow; flesh a little coarse, becoming light brownish-purple, at first adhering but becoming nearly free from the stone when fully ripe; juicy, good, slightly acid. Tree vigorous, shoots purple, smooth. Last of August. A popular market variety. Fig. 741.

Brevoo:t's. (New York Purple.) Large, oval, suture distinct at base; skin reddish, with a violet bloom; stalk three-fourths of an inch long, cavity deep, narrow; flesh soft, juicy, sub-acid, moderately rich, second-rate. Season medium. Shoots long, smooth; tree productive. Origin, New York.

Clyman.* Large to very large, roundish-oblong, slightly flattened; skin reddish-purple, with a very thick bloom, very attractive; flesh, firm, dry, sweet, free from the pit, very good. A leading early market plum in California and now finding favor elsewhere. California.

Coe Late Red. (St. Martin, Saint Martin Rouge.) Size medium, roundish, suture distinct on one side; skin light purplish-red; bloom thin, blue; stalk three-fourths of an inch long, scarcely sunk; flesh rather firm, crisp, rich, vinous. Very late, productive, shoots downy. A valuable late plum. Fig. 742.



FIG. 742.—Coe Late Red.

Columbia.* (Columbian Gage.) Very large, nearly globular, on side slightly larger; skin brownish-purple, reddish-brown where much shaded, with many fawn-colored dots; bloom blue, copious; stalk one inch long, rather stout; cavity small; flesh orange, moderately juicy, rich, rather coarse, free from the small, compressed stone, or adhering at the edge; flavor good.

Fruit liable to rot. Season medium, or end of summer. Shoots downy, stout, blunt, spreading, leaves nearly round. New York.

Corse Nota Bene. Rather large, round; surface pale lilac-brown, often dull green in the shade; bloom light blue, copious; stalk half an inch long, cavity round; flesh greenish, rather firm, crisp, rich, vinous. Very late, very productive, shoots downy.

Cruger. (Cruger's, Cruger's Seedling.) Medium, approaching small, roundish-oval, suture obscure; surface lively red, or bright lilac, with numerous yellow dots, pale fawn color in the shade, bloom thin, bluish; stalk half an inch long, cavity shallow; flesh deep orange, moderately juicy, mild, agreeable, not rich, good. Season medium. Shoots downy. Hardy, adapted to light soils, very productive. Origin, New York.

Damson.* (Common Damson, Early Damson, Purple Damson, Blue Damson.) Small, oval (an inch long), purple bloom thick,

blue; melting, juicy, sub-acid, partly free from stone. Mid-season. Profusely productive. The Damson makes good preserves. There are several sub-varieties. Europe. The *Sweet Damson* is less acid. The *Winter Damson* bears enormous crops, which hang uninjured till late in autumn. The most popular Damson for market is *Shropshire*, which is a little larger than the common blue Damson. Fig. 743.



FIG. 743.—Shropshire Damson Plum.

De Delice. Size medium, roundish-oval, with a slight neck; skin green, marbled and shaded with violet, and covered with a thin bloom; stalk three-fourths of an inch long, rather stout, very slightly inserted; flesh orange-yellow, juicy, melting, with a rich, sugary, luscious flavor, adheres slightly to the stone. End of September, and lasts long. Foreign. (Downing.)

De Montford. Size medium, roundish-oval; dull purple, streaked and dotted with russet; stalk medium, rather stout, not sunk; flesh greenish, juicy, sweet, and rich—adhering to the stone. Last of August.

Denniston Red. Medium or rather large, roundish-oval, narrowed to the stalk; suture passing half round; surface a fine light red, with fawn-colored dots; bloom very thin; stalk very long, slender, little sunk; flesh amber-colored, rich, of moderate quality, free

from the small, oval, compressed stone. Season medium, or last of summer. Shoots smooth. Origin, Albany, N. Y.

Domine. (German Prune, of some.) Size medium, long-oval, suture very obscure; skin very dark purple, bloom blue; stalk three-fourths of an inch long, scarcely sunk; flesh juicy, becoming dry, rich, sweet, good. Profusely productive. Rather late. Origin, Kingston, N. Y.

Duane Purple.* Very large, oblong-oval, longer on one side, slightly narrowed toward the stalk; skin reddish purple, bloom lilac; stalk three-fourths of an inch long, slender, cavity narrow; flesh juicy, moderately sweet, of moderate flavor, adhering mostly

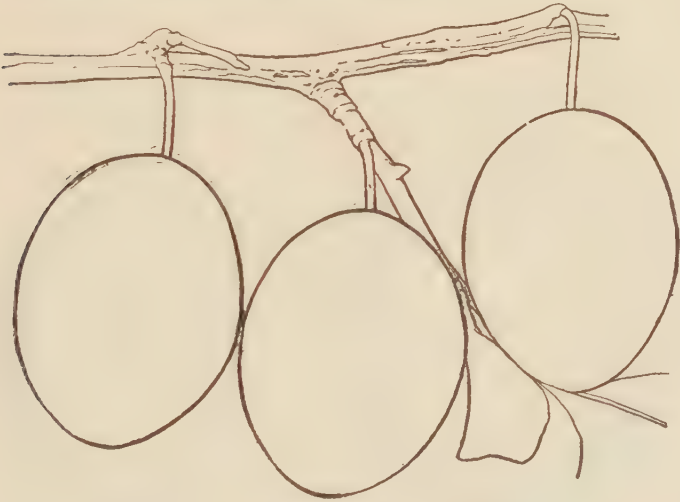


FIG. 744.—German Prune Plum.

to the stone. Rather early, ripening last half of August. Shoots very downy, leaves large, downy beneath. Origin, Duanesburg, N. Y.

Early Tours. (Précoce de Tours, Early Violet.) Medium or small; deep purple, bloom copious, blue; stalk half an inch long, cavity narrow; flesh dull yellow, slightly fibrous, rather sweet, melting, good. Quite early. Shoots downy.

Fotheringham. Size medium, obovate, suture distinct; skin purple in the sun, reddish in the shade, bloom pale blue; stalk an inch long; flesh pale greenish-yellow, juicy, sprightly, moderately rich. Rather early. Shoots smooth. English. Old.

Frost Gage. Rather small, round-oval, suture distinct on one side,

skin deep purple, bloom thin; stalk half to three-fourths of an inch long, scarcely sunk; flesh juicy, sub-acid, becoming sweet, melting, of fine but not of the highest flavor; much subject to black knot. Shoots smooth, rather slender; tree tall, upright.

German Prune.* (Quetsche.) Large, long-oval, curved or swollen on one side, with a long tapering neck to the stalk; suture distinct; skin purple, with a thick blue bloom, stalk three-fourths of an inch long, slender, slightly sunk; flesh green, firm, sweet, pleasant, not rich, free from the very long, flat, slightly curved or lunate stone; valuable for drying and preserving. Rather late. Shoots smooth. There are several sub-varieties. Largely grown for market, especially in the East. Fig. 744. Germany.

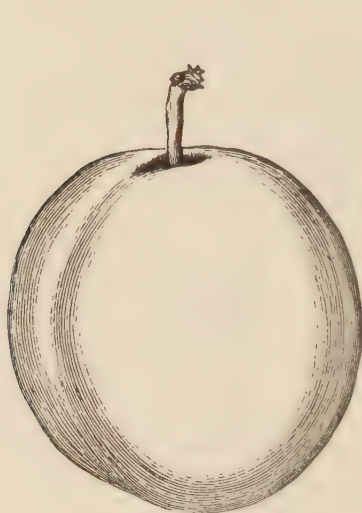


FIG. 745.—Goliath.



FIG. 746.—Italian Prune.

Giant Prune. Very large, round oblate, reddish purple; flesh dark yellow, sweet, good, freestone. Season late. Promising for culinary use and for drying. California.

Golden Cherry (Market Plum of Hoffer) is heart-shaped, yellow, speckled with scarlet in the sun; productive, and slightly earlier than the common cherry plum.

Goliath. Large, roundish-oblond or oval, enlarged on one side; skin deep red, approaching blue or purple; bloom thin, blue; stalk half or three-fourths of an inch long, cavity very deep, distinct; flesh yellowish, mostly adhering to the stone, juicy, coarse, sub-acid. Season medium. Shoots gray, very hairy, leaves narrow. Productive. Bears early—profitable. Fig. 745.

Grand Duke.* Very large, oval, dark purple, resembling Bradshaw; flesh firm, sweet, good. Season medium late. Profitable for market in New York. Quite free from rot. Tree not a strong grower, and should be worked on Lombard.

Highlander. Large, ovate, irregular; deep blue with a brownish tinge; stalk very short, slightly sunk; juicy, rich, vinous, refreshing, excellent. End of September.

Howell Early. Rather small, oval, slightly angular, suture obsolete; skin light brown, often greenish-yellow in the shade; bloom thin, blue; stalk three-fourths of an inch long, slender, not sunk; flesh amber-colored, juicy, sweet, perfumed, free from the small, oval stone. First of August. Shoots slender, gray, downy; tree productive.

Hudson River Purple Egg.* Large, oval, reddish-purple; flesh juicy sweet, not rich but very good. One of the most vigorous of all plums, but bears heavily only with age. Midseason. Valuable for market.

Ickworth Imperatrice. Medium or rather large, obovate; purple, with irregular streaks of fawn color; stalk medium; flesh greenish-yellow, sweet, juicy, rich, mostly adhering to the rather small stone. Very late, keeping into winter, becoming dryer and sweeter. Shoots smooth. English.

Isabella. Medium in size or large, oval, slightly narrowed to the base; skin dark dull red, dotted darker; stalk three-fourths of an inch long, a little hairy, cavity moderate; flesh yellow, rich, juicy, and slightly adhering to the pointed stone. Shoots quite downy. Season medium. English.

Italian Damask. Size medium, nearly round, slightly flattened at base; suture distinct, passing from base to apex; surface violet, becoming brown; stalk half an inch long, slender, cavity small, round; flesh yellowish-green, firm, sweet, high-flavored, very free from the oval, rather thick stone. Season medium. Shoots smooth.

Italian Prune. (Fellenberg.) Medium, oval, pointed and tapering at ends, suture small, distinct; dark purple, with dark-blue bloom; stalk an inch long, scarcely sunk; flesh greenish-yellow, juicy, sweet, of good quality—freestone. Last of August. Extensively grown on the Pacific coast for prunes, and a profitable market variety in the East. Can hang on the tree several weeks after ripening. Fig. 746.

Judson. Rather small, roundish, slightly oval, base a little flattened, suture indistinct; surface a handsome damask or pink, slightly mottled; stalk one inch long, slender, cavity small, rather deep; flesh juicy, rich, vinous, high-flavored, free from the rather large stone. Ripens first of August. Origin, Lansingburgh, N. Y.

Kingston. Large, long, irregular oval, pointed apex; stem stout, three-fourths inch, sutured; nearly black, dense bloom; flesh pale yellow, firm flesh, semi-cling. A fine canner. Midseason.

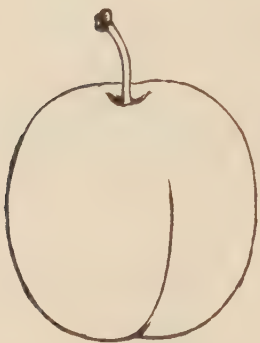


FIG. 747.—Lombard.



FIG. 748.—Marianna.

Kirke. Size medium, round, suture small; skin dark purple, bloom thin, blue; stalk three-fourths of an inch long, cavity slight; flesh greenish-yellow, firm, rich, free from the flat, broad stone. Season medium. Shoots smooth. Resembles the Purple Gage externally. Often spurious. English.

Lincoln. Large, oval, flattened at apex; red purple, slight bloom; flesh amber, juicy, sweet, free. Very prolific.

Lombard.* (Bleecker's Scarlet.) Size medium, sometimes rather large, round-oval, slightly flattened at ends, suture obscure; skin violet-red; stalk very slender, half to three-fourths of an inch long, cavity broad; flesh deep yellow, pleasant, not rich, but of fine quality. Season medium. Hardy, very prolific, well adapted to light soils. Shoots quite smooth or glossy, bright purple. Origin, Albany, N. Y.

This is a strongly fixed variety, and has in many instances produced seedlings very closely resembling itself. Largely grown for market, but rots badly. Valuable as a stock for poor growing varieties. Fig. 747.

Manning. (Large Long Blue, Manning's Long Blue Prune.) Large, long, oval, slightly one-sided, suture obscure; stalk very long, slender, scarcely sunk; skin dark purple, bloom thick, blue; flesh firm, rather juicy, nearly free from the long, pointed stone. Rather late, ripens gradually. Shoots smooth. Tree very productive

Marianna. Medium, round-oblong; red, yellow specks, fine bloom; flesh soft, juicy, sweet, semi-cling. Not especially valuable for

the fruit; the facility, however, with which this plum may be propagated from cuttings, and the readiness with which union takes place in grafting upon it, have made it a most common stock. It is supposed to be a variety of the European *Prunus cerasifera*. Originated in Texas. Fig. 748.

Meigs. Large, roundish-oval, suture indistinct; dull reddish-purple, with numerous gray dots; stalk long, slender, curved, slightly sunk; flesh greenish-yellow, rich, excellent, adhering to stone. End of September.

Morocco. (Italian Damask *erroneously*, Early Morocco, Black Morocco, Early Damask, Black Damask.) Size medium, roundish, slightly flattened at ends; suture on one side only, shallow; skin dark purple, bloom pale, thin; stalk half an inch long, rather stout; flesh greenish-yellow, adhering slightly to the stone, rich, rather acid, becoming sweet. Not first-rate, but valuable for its earliness, ripening ten days before the Washington. Shoots, downy. A moderate bearer.

Myrobolan. (Cherry, Early Scarlet.) Small (one inch in diameter), round, remotely heart-shaped; bright red, bloom faint; stalk short and slender; cavity narrow; flesh juicy, slightly fibrous, soft, melting, sub-acid, not rich, adhering to the oval, pointed stone. Ripens very early or about midsummer, its only value. Distinguished by its smooth, slender shoots, small bushy head, and narrow leaves. There are many varieties.

This plum is considered to be a variety of the *Prunus cerasifera*. It has long been a favorite stock for other plums, and immense numbers have been imported into this country. As it dwarfs the scion, however, it is not so much used as formerly.



FIG. 749.—Nectarine.

Nectarine. Large, regular, roundish; skin purple, bloom blue; stalk half an inch long, stout; flesh dull greenish-yellow, often tinged with red, rather coarse, rich, acid, partly adhering to the

stone. Rather early. Shoots nearly smooth, leaves broad. Fig. 749.

Orleans. (Old Orleans, Red Damask, Monsieur.) Size medium roundish, suture distinct, slightly larger on one side; skin dark red, purple in the sun; stalk one-half to three-fourths of an inch long, cavity wide; flesh yellowish, sweet mixed with acid, of second quality in richness, pleasant and good. Rather early. Shoots downy. There are two or three sub-varieties. England.

Orleans Early. (New Orleans, Hampton Court, Monsieur Hâtif.)

Size medium, round-oval, suture shallow, stalk half an inch long stout, or longer and slender; cavity moderate; skin reddish-purple, slightly marbled; flesh yellowish-green, rather rich Early in August.

Wilmot's Orleans scarcely differs from the Early Orleans.

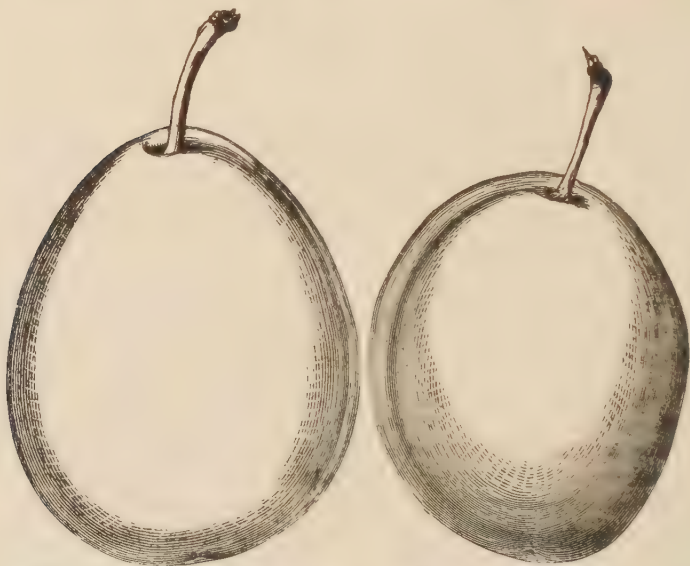


FIG. 750.—Pond's Seedling (English).

FIG. 751.—Prince Englebert.

Peach.* (Prune Pêche.) Very large, roundish-oblate, regular, flattened at ends, suture distinct, shallow; color varying from salmon to light brownish-red; stalk very short, cavity narrow, shallow; flesh rather coarse, juicy, sprightly free from the nearly round, very flat, much furrowed stone. Shoots smooth, vigorous. Quality not very high, moderate bearer, tree somewhat tender. Matures about ten days before the Washington.

Pond.* (Pond's Seedling, Hungarian Prune.) Very large, ovate, slightly tapering to stalk; skin thick, reddish-violet, with numerous brown dots, and covered with a handsome bloom; rather coarse, juicy, moderately rich. Middle of September. Tree vigorous, branches smooth, grayish. A beautiful showy fruit. England. Fig. 750.

Pond's Seedling, of Massachusetts, a very distinct sort, is medium in size, roundish, purple; flesh yellowish, rather dry, sweet with acid, flavor moderate or poor. Early. Shoots downy.

Prince Englebert. Large, oblong-oval; deep bluish-purple, with a dense bloom; stalk rather slender, with a fleshy ring at base, cavity rather deep and narrow; flesh juicy, melting, with a pleasant, moderately rich, and very good flavor—freestone. End of August. Shoots downy. Belgian. Fig. 751.

Prune d'Agen, or Agen Date.* Size medium, obovate, flattened one side; skin reddish-purple, bloom blue; stalk short; flesh greenish-yellow, very sweet and excellent. Very late, profusely productive. Shoots smooth, leaves narrow. French. Culinary. Extensively grown for prunes on the Pacific coast, and there often called the "Petite" or French Prune.

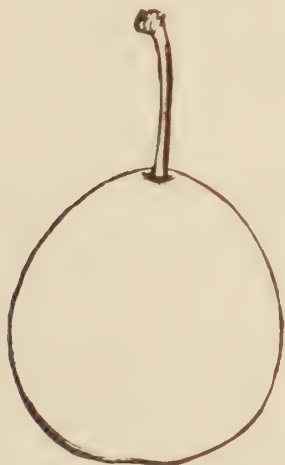


FIG. 752.—Purple Favorite.



FIG. 753.—Purple Gage.

Purple Favorite. Size medium, or rather large, round-obovate; suture obsolete; skin brownish-purple; bloom thin, light blue; stalk three-fourths of an inch long, scarcely sunk; flesh pale greenish, juicy, tender, melting, rich, sweet, excellent, free from the very small, roundish stone. Season about medium, or last week of August. Shoots nearly smooth, short-jointed, growth slow, much resembling that of the Red Diaper. Origin, Newburgh, N. Y. Fig. 752.

Purple Gage.* (Reine Claude Violette, Violet Queen Claude.) Size medium, roundish, slightly flattened at ends, suture distinct, shallow; surface violet, bloom light blue; stalk an inch long, cavity narrow; flesh rather firm, greenish-yellow, rich, sugary, of very high and excellent flavor, free from the oval, compressed stone. Ripens rather late, hanging long, and slightly shrivelling on the tree. Shoots smooth, resembling those of the Green Gage. A spurious sort is often disseminated. Fig. 753. Europe.

Quackenboss.* Very large, oblong-oval; deep purple; suture faint, stalk short, slightly sunk; slightly coarse, sprightly, very good, partly freestone. Mid-season. Popular for market in New York. New York.

Red Diaper. (*Diaprée Rouge*, *Mimms*, *Imperial Diadem*.) Large, obovate, somewhat necked; skin reddish-purple, with a few yellowish specks, bloom light blue; stalk three-fourths of an inch long slender, slightly hairy, little sunk; flesh pale green, juicy, melting rich, of fine flavor, free from the quite small stone. Season medium or end of summer. Shoots nearly smooth; growth slow Fig. 754.



FIG. 754.—Red Diaper.

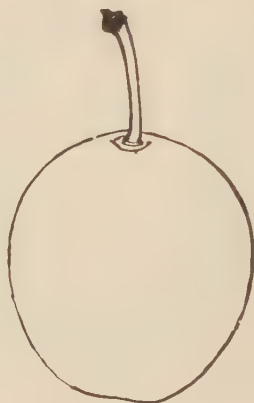


FIG. 755.—Red Gage.

Red Gage. Medium or rather small, round-ovate; brownish-red; stalk rather slender, cavity narrow; flesh greenish-amber, juicy, melting, rich, mild, sweet, free from the small stone; flavor unusually pleasant and refreshing. Rather early. Shoots dark reddish, smooth; leaves of the young trees deep green, crimped. Origin, Flushing, L. I. Fig. 755.

Red Magnum Bonum. (*Purple Egg*, *Red Imperial*, *Purple Magnum Bonum*, *Imperial Violet*, *Red Egg*.) Large, oval, tapering to the stalk, suture strong, one side swollen; surface deep red in the sun, bloom thin; stalk an inch long, slender, cavity narrow; flesh greenish, coarse, firm, sub-acid; valuable only for cooking. Season medium. Shoots smooth. Some sub-varieties are clingstones.

Rivers' Favorite. Rather small, roundish-oval, with a shallow suture; nearly black with russet dots, bloom blue; flesh greenish-yellow, juicy, excellent. Very early, immediately succeeding Primordian, and better in quality. English.

Royale. (*Royal*, *La Royale*.) Size medium, sometimes rather large,

round, slightly narrower toward the base, or approaching obovate; suture distinct on one side at apex; skin reddish-purple, bloom very thick, stalk three-fourths of an inch long, cavity narrow; flesh dull yellow, rather firm, melting, juicy, rich, of excellent

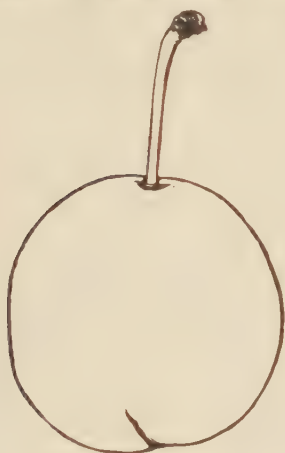


FIG. 756.—Royale.



FIG. 757.—Early Royal.

flavor. Ripens first of September. Shoots very downy, growth slow, tree spreading, moderately productive. French. Fig. 756.

Royale Hative, or "Early Royal."* (Mirian.) Size medium, roundish, slightly wider at base; skin light purple, stalk half an



FIG. 758.—Royal Tours.



FIG. 759.—Schenectady Catherine.

inch long, stout, scarcely sunk; flesh amber yellow, with a rich, high flavor, nearly free from the small, flattened, ovate stone.

Early. Resembles Purple Gage, but a month earlier. Shoots very downy. French. Fig. 757.

Royal Tours. (Royale de Tours.) Large, roundish, suture deep, half round, one side swollen; a white depressed point at apex; skin red in the shade, deep violet in the sun, bloom copious, blue; stalk half to three-fourths of an inch long, cavity narrow; flesh greenish-white, rather firm, juicy, rich, high-flavored, adhering closely to the large, oval, flattened stone. Quite early; shoots quite downy. Valuable for its earliness and good quality. The genuine sort is very rare. French. Fig. 758.



FIG. 760.—Sharp's Emperor.



FIG. 761.—Victoria.

Schenectady. Size small or nearly medium, roundish, slightly narrowed to the apex; suture rather shallow; skin deep purple-violet in the shade, slightly netted on the sunny side; stalk three-fourths of an inch long, slender; cavity deep, narrow; flesh greenish-yellow, melting, sweet, rich, excellent, next to the Green Gage in quality, ripening last of August. Shoots rather slender, smooth. Tree extremely hardy, productive, and reliable. Fig. 759.

This is quite a distinct variety, often reproducing itself from seed not perceptibly varying from the parent.

Sharp's Emperor. Quite large, roundish-oval; skin a bright red, paler in the shade, bloom delicate; flesh deep yellow, pleasant, moderately rich. Very productive. Shoots strong, downy, leaves large. English. Showy. One of the best market sorts. Fig. 760.

Smith.* (Smith's Orleans.) Large, oval, slightly wider at base, a little irregular, suture deep on one side; skin reddish-purple,

becoming very dark, bloom deep blue; stalk small, slender; cavity narrow, deep; flesh deep yellow, slightly firm, juicy, rich. Shoots vigorous, straight, glossy reddish-purple; leaves dark green, crimped. Ripens early. Productive in nearly all soils. Long Island.

Suisse. (Prune Suisse, Swiss Plum, Simiana, Monsieur Tardif.) Medium or rather large, round, suture broad, shallow; a sunk point at apex; skin lively violet red, thickly dotted, and slightly



FIG. 762.—Wangenheim.

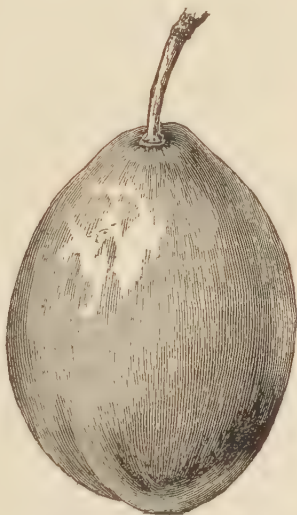


FIG. 763.—York State.

marbled; bloom blue, copious; stalk three-fourths to an inch long, cavity wide; flesh crackling and melting, flavor brisk, rich, slightly sharp, adhering to the thick, rough-edged stone. Quite late. Shoots smooth. Distinct from the "Semiana," of Boston.

Thomas. Large, round-oval, slightly irregular, somewhat compressed on the suture; skin salmon color, with a soft red cheek and numerous dots; stalk hairy, one-half to three-fourths of an inch long, stout; cavity small, narrow; flesh pale yellow, somewhat coarse, mild, pleasant, free from the very light-colored stone. Shoots slightly downy. Productive. Season medium. Origin, Boston.

Tragedy.* (Prune Tragedy.) Medium to large, oval, dark purple; flesh yellowish-green, free, sweet, very good. Season early. Highly valued in the West for early market. California.

Victoria. Large, obovate, suture distinct; color a fine light reddish-purple; stem half an inch long, cavity rather deep and narrow; flesh yellow, pleasant—clingstone. It has been long known in some parts of England—stands next to Pond's Seedling in size,

beauty, and productiveness. A great grower, irregular. Distinct from and better than Sharp's Emperor. Fig. 761.

Wangenheim.* Medium, oval, suture shallow but distinct, dark blue, stem short, set without depression; flesh greenish-yellow, juicy, firm, sweet, rich, "very good," partly free from the rather large stone. German, a sort of prune. Growth erect, moderately vigorous, tree very productive. One of the best of its class. Fig. 762.

Wax. Large, slightly oval; rich yellow, mostly covered with red bloom lilac; stalk long; flesh greenish-yellow, juicy, sprightly, freestone. October. Albany, N. Y.

York State Prune. Large, oval, sutured at apex, dark blue, light bloom, firm, juicy, free. Vigorous, productive; a good market plum. New York. Fig. 763.

DIVISION III. GREEN, WHITE OR YELLOW.

Albany Beauty. (Denniston's Albany Beauty.) Size medium or rather small, roundish-oval, with a slight neck at base, suture obscure; surface pale whitish-green, purple dots numerous, bloom thin; stalk an inch or more long, slender, scarcely sunk; flesh yellow, moderately juicy, rich, sweet, free from the small, pointed stone. Ripens the last week in August. Shoots lightly downy. Origin, Albany, N. Y.

Apricot. (French Apricot.) Size medium or rather large, roundish, suture deep; stalk scarcely half an inch long; surface yellow, dotted and tinged with red in the sun; bloom white; flesh yellow rather firm, slightly bitter, becoming, when ripe, melting, juicy, and pleasant. Rather early. Shoots quite downy.

The English Apricot plum is a third-rate, clingstone, oval fruit, with smooth shoots.

Autumn Gage. (Roe's Autumn Gage.) Size medium, ovate, slightly conical; stalk three-fourths of an inch long, not sunk; surface pale yellow, bloom thin, whitish; flesh greenish-yellow, juicy, sweet, delicate, pleasant, free from the long, pointed, compressed stone. Leaves pointed, shoots smooth, spreading. Ripens rather late. Growth very slow. Very productive. Origin, Newburgh, N. Y.

Bleecker's Gage. Size medium; roundish-oval, regular, suture obscure; stalk an inch long, rather stout, downy, slightly sunk;

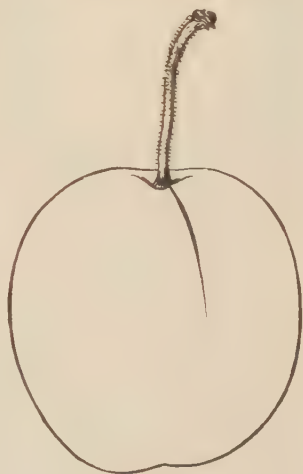


FIG. 764.—Bleecker's Gage.

skin yellow, with sunken white specks; bloom thin, white; flesh yellow, rich, sweet, luscious, partly free from the pointed stone. Ripens at the end of summer. Shoots downy. Distinguished from Prince's Yellow Gage by its larger stalk and later maturity. Origin, Albany, N. Y. Fig. 764.

Bingham. Large (an inch and three-fourths long), oval, rather widest at base; surface deep yellow, with rich red spots to the sun; stalk slightly sunk; flesh yellow, juicy, rich, delicious. Season of ripening medium, or end of summer and first of autumn. Shoots downy. Handsome, productive, and valuable. Origin, Pennsylvania.

Buel's Favorite. Rather large, ovate, broadest at base; suture distinct half round; stalk two-thirds of an inch long, rather stout, little sunk; surface pale green, thickly sprinkled with lighter dots, base with reddish specks; flesh greenish-yellow, rather firm, juicy, rich, high-flavored, adhering to the long pointed stone. Ripens at the close of summer. Shoots smooth, reddish. Origin, Albany, N. Y.

Coe's Golden Drop.* Very large (often more than two inches long), oval, suture distinct, one side more enlarged, necked; light yellow, often dotted red to the sun; stalk three-fourths of an inch long, rather stiff; flesh yellowish, rather firm, rich, sweet, not fine-grained, closely adhering to the pointed stone. Quite late, does not always ripen at the North—requires a long season. An excellent late sort, of English origin. Shoots smooth, rather glossy. Extensively grown on the Pacific coast as the "Silver Prune."

Dana's Yellow Gage. Size medium, oval; pale yellow, marbled with darker green, bloom very thin; flesh juicy, lively. Season medium. Very productive. Hardy. Massachusetts.

De Caradeuc. Medium, round; yellow with dark red or brown cheek; well-marked suture; skin thin; flesh very juicy, sweet, cling. Early. Considered to be a variety of *Prunus cerasifera*. Originated in South Carolina.

Denniston's Superb. Size medium, round, obscurely oval, slightly flattened, suture distinct; surface pale yellowish green, slightly dotted and clouded with purple, bloom thin; stalk rough, three-fourths of an inch long, moderately sunk; flesh thick (stone small), not juicy, rich, vinous, free from the thick, roundish stone. Ripens rather early, or last fortnight of summer. Resembles Green Gage, rather earlier, and not so good. Shoots downy. Very productive. Origin, Albany, N. Y. One of the handsomest of plums.

Downton Imperatrice. Size medium, oval, base tapered or with a neck; skin thin, pale yellow; flesh yellow, melting, acid, becoming rather sweet. Ripens late, or end of September. Shoots smooth, long, strong, upright. For preserving. A cross of the White Egg and Blue Imperatrice.

Drap d'Or. (Yellow Perdrigon, Mirabelle Grosse.) Rather small, round, suture indistinct, apex dimpled; stalk half an inch long, slender; surface golden yellow, sometimes a few crimson dots to the sun; flesh yellow, sweet, rich, often half dry, partly adhering

to the stone; ripens a week before the Green Gage. Shoots slightly downy, growth slow.

Drap d'Or of Esperin. Large, roundish-oval; golden yellow; stalk short, stout, little sunk; flesh yellowish, rather coarse, juicy, sweet, rich—freestone. Last of August.

Early Yellow Prune. Rather large, oval; yellow, dotted red; stalk medium, slightly sunk; sweet, juicy, slightly melon-flavor—freestone. Middle of August. Great bearer.

Fulton. Medium, oval approaching ovate; suture distinct; bright yellow; stalk and cavity medium; flesh yellow, juicy, with a rich, high flavor. October. Tree vigorous, productive, fruit hangs long. Fig. 765.

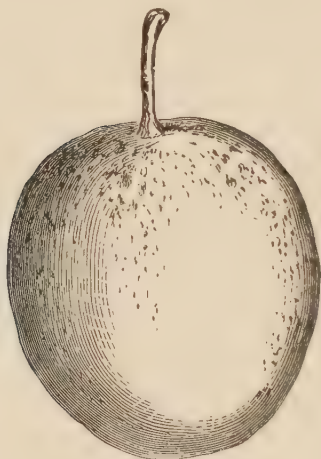


FIG. 765.—Fulton.

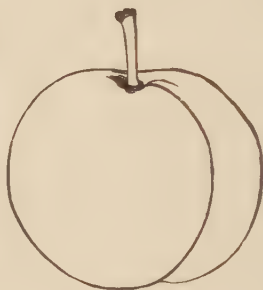


FIG. 766.—Green Gage.

General Hand. Very large, roundish-oval; skin deep golden yellow; stalk long; flesh moderately juicy, not high-flavored—freestone. Shoots nearly smooth. Mid-season.

Green Gage.* (Reine Claude, Bruyn Gage.) Rather small, round; suture faint; surface green, becoming yellowish-green, usually with reddish-brown dots and network at base; stalk half to three-fourths of an inch long, scarcely sunk; flesh pale green, melting, juicy, exceedingly sweet and rich, and unequalled in flavor. Ripens about the middle of August. Shoots smooth, buds with large shoulders, growth slow, and young trees difficult to raise in most localities. Europe. Old. There are many seedlings, inferior to the original, and many worthless green plums called by this name. Grown for prunes on the Pacific coast. Fig. 766.

Henry Clay. Medium, oval, suture slight, yellow, marbled and shaded red; stalk long, slender, scarcely sunk; juicy, sweet;

stone small, nearly full. End of August. A handsome and productive variety. Albany, N. Y.

Howard's Favorite. Large, necked, rich yellow, dotted and shaded with carmine, bloom lilac; stalk long, inserted in a ring; flesh rather coarse, but very sugary, rich, and delicious—somewhat adherent to the stone. September. Tree vigorous, fruit hangs long. Albany, N. Y.

Hudson Gage. Size medium; oval, suture obscure, one side slightly larger; surface yellow, clouded or streaked faint green, bloom thin, white; stalk about two-thirds of an inch long, moderately



FIG. 767.—Huling's Superb.

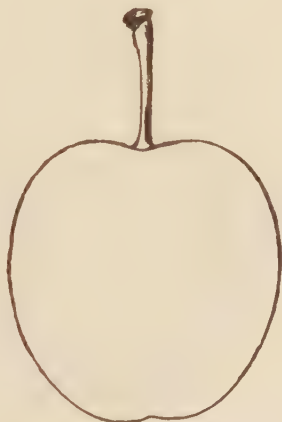


FIG. 768.—Imperial Gage.

sunk; flesh greenish, juicy, melting, rich, sprightly, excellent, nearly free from the small stone. Ripens two weeks earlier than Washington, and three weeks before Imperial Gage, which it partly resembles. Origin, Hudson, N. Y.

Huling's Superb.* Large, round-ovate, suture shallow, indistinct; stalk one inch long, stout, slightly sunk; skin dull greenish-yellow; bloom pale, thin; flesh rather firm; flavor rich, brisk, excellent. Ripens latter part of summer. Shoots thick, vigorous, downy, leaves very large. A moderate bearer. Origin, Pennsylvania. Fig. 767.

Imperial Gage.* (Flushing Gage, Prince's Imperial Gage, White Gage, of Boston.) Fruit rather large, oval, suture distinct; stalk three-fourths of an inch long, slightly hairy, evenly sunk; surface green, slightly tinged yellow, with marbled green stripes; bloom copious, white; flesh greenish, juicy, melting, rich, of very best quality, sometimes adhering, but usually nearly free from the

oval, pointed stone. Ripens first of autumn. Shoots long, upright, vigorous, slightly downy; leaves with a slight shade of blue. Fig. 768. For home use only.

Imperial Ottoman. Nearly medium in size, oval, suture on one side halfway from base to apex; somewhat pellucid; surface pale greenish-yellow, marbled; stalk three-fourths of an inch long, downy, slender, curved, scarcely sunk; surface dull yellow, clouded darker, bloom thin; flesh very juicy, sweet, excellent, scarcely adhering to the pointed stone. Ripens first of August. Great bearer. Shoots slightly downy; tree hardy, succeeds well as far north as Maine. Fig. 769.



FIG. 769.—Imperial Ottoman.

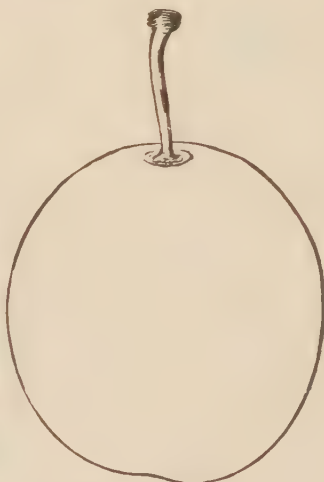


FIG. 770.—Jefferson.

Ives' Seedling.* Large, ovate, suture distinct; yellow, mottled and dotted red, bloom thin; stalk short, slightly sunk; flesh rich amber color, juicy, high flavored—freestone. First of September. Growth moderate, buds prominent. Massachusetts.

Jefferson. Large, oval, base slightly narrowed, suture slight; greenish-yellow, becoming golden yellow, often faintly reddened to the sun, bloom thin, white; stalk an inch long, sunk little or none; flesh rich yellow, moderately fine grained, in well-ripened specimens orange; very juicy, nearly free from the long, pointed stone; flavor rich, luscious, excellent. Early. Origin, Albany. A very fine dessert plum. Fig. 770.

Lawrence Favorite. (Lawrence Gage.) Large, roundish, slightly oblong-oval, obtuse; surface dull yellowish-green, clouded darker, bloom light bluish-green; base, when ripe, with a brownish-red network and dots; stalk half an inch long, small, cavity narrow; flesh greenish, melting, juicy, rich, excellent. Shoots

short, rather upright, downy leaves small, dark green. Rather early or middle of August. Origin, Hudson, N. Y. Fig. 771.

Lucombe's Nonsuch. Medium or rather large, roundish; skin yellowish-green with yellowish-orange, bloom whitish; suture broad; stalk three-fourths of an inch long, cavity wide; flesh rather firm, rich, sweet, with acid. Fig. 772.

Madison. Size medium, roundish, suture shallow; rich yellow, dotted and shaded crimson next the sun; stalk short, stout, little sunk; flesh rich yellow, slightly coarse, with a rich flavor, adheres

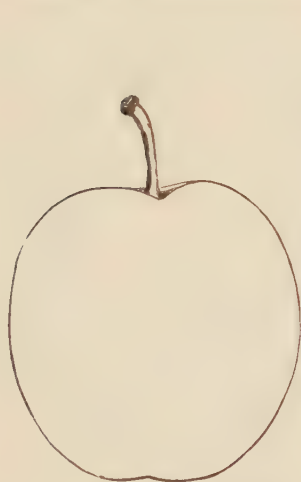


FIG. 771.—Lawrence's Favorite.



FIG. 772.—Lucombe's Nonsuch

slightly to the stone. End of September. Shoots smooth, tree vigorous, productive. Albany, N. Y. Closely resembles Denniston's Superb.

McLaughlin.* Rather large, roundish-oblately, much flattened at ends, suture obscure; stalk three-fourths of an inch long, scarcely sunk; skin thin, tender, russet-yellow, sprinkled with thin red, purplish at base; flesh rather firm, juicy, sweet, luscious. Stone clings. Ripens at the end of summer. Growth vigorous, leaves large, glossy, shoots smooth. Origin, Bangor, Me. Fig. 773.

Mirabelle. Very large, obovate, suture distinct; stalk half an inch long, slightly sunk; surface a fine yellow, slightly spotted with red, bloom white; flesh orange, sprightly, becoming dry. Ripens with the Green Gage. Shoots downy, tree small. A small, beautiful, second-rate plum, very productive, and valued for preserving. Its seedlings are used as stocks for dwarf plums.

Moldavka. Medium, oval, pointed apex; light yellow, thick bloom flesh orange, rich, semi-cling. Early. Russian.

Monroe.* Full medium, roundish-oval; greenish-yellow; stalk rather long, slightly sunk; flavor rich, and good. Mid-season. Tree a healthy, strong grower, and great bearer. Monroe County, N. Y.

Mulberry. Large, oval, tapering, with a neck to the stalk, suture slight; pale dull yellow, with a few crimson dots; bloom thin; stalk an inch long, slender, scarcely sunk on the obtuse end of the neck; flesh greenish-yellow, rather coarse, melting, rich, adhering to the large, oblong, pointed stone. Ripens the first of autumn. Shoots stout. Origin, Albany, N. Y.



FIG. 773.—McLaughlin.

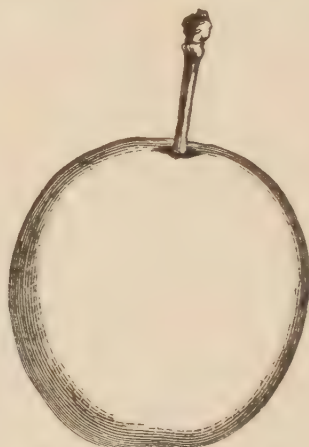


FIG. 774.—Nelson's Victory.

Nelson's Victory. Size medium, roundish-oval; brownish-yellow, with some dull red; stone small; flesh free, juicy, good. Tree vigorous, great bearer, fruit showy, fine for market. English. Fig. 774.

Orange. Very large, oval, flattened at ends; bronze-yellow, rough, marked with purplish-red near the base; stalk three-fourths of an inch long, cavity narrow; rather coarse, acid. End of August.

Parsonage. Rather large, oval, pale yellow, stalk medium, slightly sunk; flesh yellow, juicy, with a rich, sugary flavor. Free from the stone. First of September. Tree vigorous, upright, productive. New. Dutchess County, N. Y. (Downing.)

Peters' Yellow Gage. Large, nearly oval, varying in its form; rich yellow, crimson dots next the sun; stalk three-fourths of an inch long, set in a deep cavity on one side of the plum; suture distinct, dividing the fruit unequally; flesh greenish-yellow, rich, sweet, very good. Fig. 775.

Précoce de Bergthold. Small, roundish-oval; yellow; juicy, sweet. Very early, middle of July.

Primordian. (Jaune Hâtive or Early Yellow, White Primordian.) Small, obovate, necked; suture small; stalk slender, downy, half an inch long; pale clear yellow, bloom thin; flesh yellowish, moderately juicy, with a rather sweet, mild, good flavor; very free



FIG. 775.—Peters' Yellow Gage.

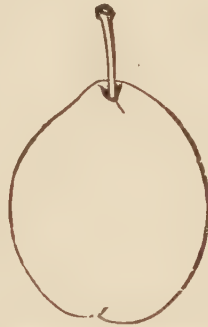


FIG. 776.—Primordian.

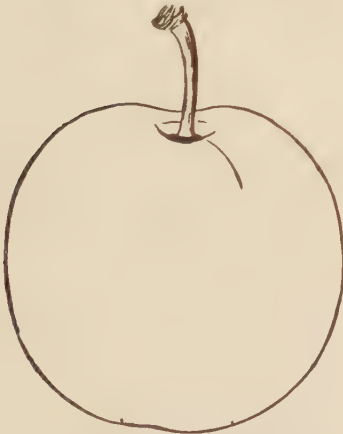


FIG. 777.—Washington.



FIG. 778.—White or Yellow Damson.

from the stone. Middle of July. Shoots quite slender, very downy, growth slow. Valuable only for its extreme earliness. Fig. 776.

Reine Claude de Bavay.* Round-oval; greenish-yellow, spotted with red, with small, violet-colored, longitudinal veins; flesh rather firm, juicy, sugary, rich, of fine quality, adhering slightly to the stone. Shoots smooth; leaves roundish, shining—the growth resembling Washington, but leaves smaller and shoots slenderer. Very productive. Mid-season. Belgium.

Schuyler Gage. Size medium, oval, suture moderate; yellow with green splashes, dotted and shaded with red next the sun; stalk long, curved, slightly sunk; flesh yellow, juicy, sweet, excellent. Resembling Green Gage—free from the stone. Last of September. Tree vigorous, productive. Albany, N. Y.

St. Catherine. Size medium, obovate, suture very distinct, passing half round; skin pale yellow, sometimes slightly reddish to the sun, bloom thin, white; stalk three-fourths of an inch long, very slender, slightly sunk; flesh juicy, rather firm, rich, fine. Ripens rather late. Shoots smooth, rather slender.

St. Martin Quetsche. Size medium, ovate, broadest at base; surface pale yellow, often spotted with brown, bloom white; flesh yellow, very juicy, rich, excellent. Ripens at mid-autumn and keeps long. Shoots smooth. A profuse bearer. A good late plum. German. Too late for the far North.

Washington.* (Bolmar, Bolmar's Washington.) Large, often very large, roundish-oval, suture obscure, distinct at base; surface yellowish-green faintly marbled, often with a pale red blush; stalk one-half to three-fourths of an inch long, slightly downy; cavity wide, shallow, flesh rather firm, sweet, mild, moderately rich, free from the pointed stone. Rather early, last half of August. Shoots downy, very vigorous, leaves very large. Often unproductive. Origin, New York city. Fig. 777.



FIG. 779.—Yellow Gage, Princes.

White or Yellow Damson. (Late Yellow Damson.) Small (one inch long), oval, pale yellow, dotted with reddish-brown; stalk half an inch long, downy, not sunk; flesh rich, sub-acid, agreeable; ripens very late, hanging long on the tree. Shoots smooth, growth free. Tree very productive. Fig. 778.

Yellow Egg.* (White Magnum Bonum, White Imperial, White Egg.) Very large, oval, narrow at ends, necked at base, suture distinct, stalk an inch long, not sunk, surrounded by a fleshy ring at insertion; skin light yellow, bloom thin, white; flesh firm, coarse, acid, becoming sweeter by ripening, adhering closely to the long, pointed stone. Ripens about the end of August.

Very largely grown for market and for culinary use.

T. Rivers, of Sawbridgeworth, England, says the Yellow Magnum Bonum is an American plum of extreme hardiness—good,

but not first-rate—flesh clings—and bears more freely than “our old White Magnum Bonum.”

Yellow Gage; English. (Little Queen Claude.) Small, round, suture on one side distinct; surface pale yellowish-green, becoming yellow, with a few reddish dots, bloom dense; stalk half an inch long, slender, slightly sunk; flesh very sweet, pleasant, quite free from the stone. Ripens nearly with the Green Gage. Shoots long, smooth. Of French origin.

Yellow Gage, Prince's.* (American Yellow Gage.) Size medium; oval, slightly broadest at base; suture a mere line; surface golden yellow, slightly clouded; bloom white, copious; stalk an inch long, cavity small, round; flesh deep yellow, rich, sugary, melting, sometimes rather dry. Ripens early in August. Shoots smooth, short-jointed, leaves glossy, tree becoming spreading. Origin, Flushing, L. I. Fig. 779.

JAPANESE GROUP—PRUNUS TRIFLORA.

DIVISION I. RED, PURPLE, OR BLUE.

Abundance.* (Douglas, Babcock.) Tree erect, strict. Fruit medium to large, round-oblong, with a pointed apex; skin pink-coppery-red, marked with many small dots; flesh firm, very juicy, sweet, cling. Early, very variable, especially in quality and season of ripening. Considered to be the best all-round variety



FIG. 780.—Abundance Japanese Plum.

of this group. The Chase is probably identical with this. Fig. 780.

Berckmans. Medium, round-oblong, tending to have a blunt point; skin deep bright red; flesh firm, dry, sweet, becoming insipid when dead ripe, cling. Mid-season. Distinguished from all other Japanese plums by its very dry flesh. Some of the trees sold as Berckmans are Abundance, to which it is inferior.

Berger. (Strawberry Ura-Beni, Uchi-Beni, Honsmomo, of some.) Tree spreading; fruit small, cherry-like, globular; skin bright red; flesh very meaty, yellow, sweet, very good, free. Fruit



FIG. 781.—Berger Japanese Plum.

falls when ripe. Midseason. Handsome and of fine quality, but too small for market. Recommended for home use. Fig. 781.

Burbank.* Tree flat-topped, very spreading, distinct; fruit medium to large, round-oblong, with a blunt apex; skin orange-yellow, dotted and marbled with red, deepening to a cheek; flesh meaty, yellow, sweet, rich, cling. Mid-season to late. Hangs on tree well. Admirable for canning. Second only to Abundance in popularity as a market plum. Fig. 782.

Chabat.* (Bailey, Yellow Japan, Fruruguja, O-Hatankyo, Uchi-Beni of some.) Tree a strong, upright grower, prolific; fruit

medium to large, oblong conic, with no tip; skin deep yellow overlaid with light red and many small golden dots; flesh usually firm, yellow, sweet, excellent, cling. Mid-season to late. One of the best for any purpose.

Earliest of All. (Yosebe, Wasse Smomo.) Fruit small, round oblong; skin pink-red; flesh yellow-soft, sour, poor, cling. Very early. Fruit drops when ripe. Its only merit is earliness.

Engre.* Fruit flattened at both ends; skin dark red; flesh soft, yellow, cling, sour but not bitter, fair to good. Handsome, prolific. Very early. Much superior to Earliest of All, and ripening but a few days later.



FIG. 782.—Burbank Japanese Plum.

Hale. Tree upright; fruit medium to large, globular, not pointed; skin yellow, mottled and speckled with red, handsome; flesh yellow, soft, juicy, good, cling. Mid-season. Sometimes colors poorly and drops prematurely. California.

Kelsey. Tree an upright grower, with narrow leaves; fruit very large, heart-shape, tapering, lop-sided, with a deep suture; skin bright reddish-purple on yellow ground; flesh yellow, cling, very good. Late. Tender in the North. Valued in California. The first Japanese plum distributed.

Maru. Medium, globular, with an obtuse point; skin maroon red; flesh yellow, soft, sweet, good, cling. Season of Abundance and much inferior to that variety.

Red June.* (Red Nagate, Nagate-no-Botankyo.) Tree very vigorous, spreading; fruit medium to large, oblong, heart-shape,

with a distinct suture, often lopsided; skin uniform bright red, very handsome; flesh yellowish-white, semi-cling, firm, juicy, good. One of the best second early varieties for market or home use. Fig. 783.

Satsuma.* (Blood, Yonemomo.) Tree spreading, very prolific in a mixed orchard; fruit large, round-oblong to round-conic, with a short, blunt point; skin dark red, specked with greenish dots; flesh very firm, blood red, cling, rather coarse, good. Excellent for canning but not desirable for eating out of hand. Season late, and a very long keeper.

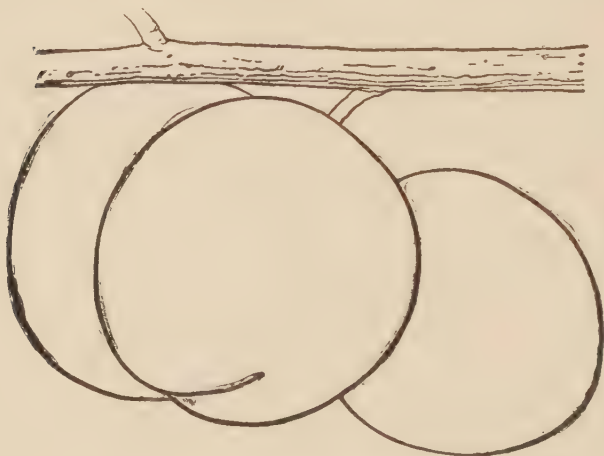


FIG. 783.—Red June Japanese Plum.

Simon or Prunus Simoni. Tree a very strict, upright grower, often unproductive in the East; fruit large, flattened, apple-shape; skin deep red, sprinkled with small yellow dots; stem short, the fruit sticking closely to the branches; flesh yellow, cling, poor. Early. In the interior regions of California it is said to be of good quality and is largely grown for market. *Prunus Simoni* is distinct from the Japanese plums, *Prunus triflora*, and is generally considered to be a good species. China.

Wickson.* Tree a very upright grower, of *Simoni* habit, a shy bearer in many places; fruit very large, long-heart shape, tapering to the blunt apex; skin deep maroon red; flesh very firm, yellow, cling, sub-acid, rich, very good. Fruit borne on the old wood only, not in clusters. Mid-season. Probably has *Prunus Simoni* blood in it. Originated by Burbank, California. An excellent shipper, but too often a shy bearer.

Willard. Medium, roundish, angular; skin dark red; flesh firm, whitish free, of poor quality. Very early. Too poor to be of any value whatever.

DIVISION II. YELLOW.

Georgeson. (White Kelsey, Hattankio Round.) Tree sprawling, much forked; fruit medium, round flattened usually not pointed; skin golden yellow; flesh firm, yellow, cling, sweet, slightly mawkish, good. Mid-season. Long keeping. Trees sold as Georgeson bearing pointed fruits are Kerr.

Kerr. (Hattankio Oblong, Hattonkin, of some, Georgeson of some.) Medium, tapering to a long point; skin orange-yellow; flesh firm, yellow, cling, sweet, fair to good. Early. Fruit falls before fully ripe.

Normand. Medium to large, obtusely conical, clear golden yellow; flesh firm, yellow free, of very good quality. Ripens with Abundance.

Ogon.* Medium, roundish-oblate; skin lemon-yellow with a heavy, whitish bloom; flesh very firm, free, with a peculiar musky almond flavor; of indifferent quality, but good for canning. Second early.

CHAPTER XXXII.

THE QUINCE.

THE quince, a small, irregular growing tree, about ten or twelve feet high, bears one of the best fruits for preserves and jellies, and for giving additional flavor to apple cooked in any manner. It is usually propagated by layers and cuttings. Propagation by layers is performed by bending young shoots



FIG. 784.—Neglected Quince-Tree.

down in spring, and burying them so as to leave a few buds at the extremity above ground, as described on page 26 of this work. When the buds on the shoots have well started, all are rubbed off or cut away but the best. They will throw out roots by autumn, and may be removed from the parent tree, and set out in rows; those which do not root the first year may be left till the second. If the ground is rich, and they are kept well-cultivated and straightened by stakes, the cuttings and layers will pro-

duce trees fit for removal as standards in two or three years. This mode is more commonly used in raising the orange quince as a fruit. In the extensive propagation of stocks for the pear, layering by stools is adopted. They are made by cutting back strong plants to within a few inches of the surface of the ground early in spring, or before the buds swell, which induces them to throw up a number of strong shoots, constituting the stools. These are earthed up

the following spring, so that the whole of the stem and the base of all the shoots will be covered three or four inches deep. Roots will be thrown out during the same season, and these rooted shoots are separated from the plant in the autumn for transplanting in rows. The stools are well cultivated and dressed with manure the following season, and will produce another crop of shoots the second year. As each stool yields a crop in alternate seasons, there should be two sets, so that an annual supply may be obtained.

The quince is extensively propagated by cuttings, both in raising stocks and trees for fruiting. The details of the operation are described on pages 24 and 25 of this work.

The *soil* for the quince should be deep and rich, such as will raise good corn and potatoes, and should be kept well cultivated. An application of good manure should be made every year or two, and a thin sprinkling of salt over the surface in spring has often been found beneficial.

Directions for pruning young quince-trees will be found on page 106.

The total neglect of the cultivation of the quince by many who have planted out the trees has resulted in their dwarfish and stunted growth and entire unproductiveness. To renovate such trees, cut or saw out the thick profusion of suckers which surround the stem (Fig. 785), deepen the soil with the



FIG. 785.—Untrimmed Quince Bush.



FIG. 786.—Well-Pruned Young Quince-Trees.

spade as much as the roots will admit, and apply a large barrow-load of compost to each tree, made by a thorough intermixture, some weeks previously, of stable manure and black mud, or other compost, and then spread a thin coating of salt upon the surface. This

should be done in the spring of the year. The pruning may be such as to remove the suckers, and reduce the number of stems to three or four, or the tree may be trimmed to one clean stem, as shown in Fig. 786. The fruit will be greatly improved by the operation. Fig. 785 shows a common appearance of a neglected tree.

In planting quince orchards, the distance asunder may be about ten or twelve feet, which will be found near enough for full-grown trees, on a deep, rich, and well-treated soil. If the ground is previously subsoiled, and well manured by trench-ploughing, the young trees will come into bearing in about three years, and continue productive, if well managed, for forty years or more.

VARIETIES.

Alaska. Large, pyriform, hardy, productive, bears early.

Angers. This variety is cultivated as stock for the pear. The fruit is pear-shaped, golden-yellow. It is later and a little harder in texture than the Orange Quince. The tree is distinguished by its vigorous growth and large leaves, and it continues growing late in the season.

FIG. 789.—Orange. FIG. 790.—Meech's.

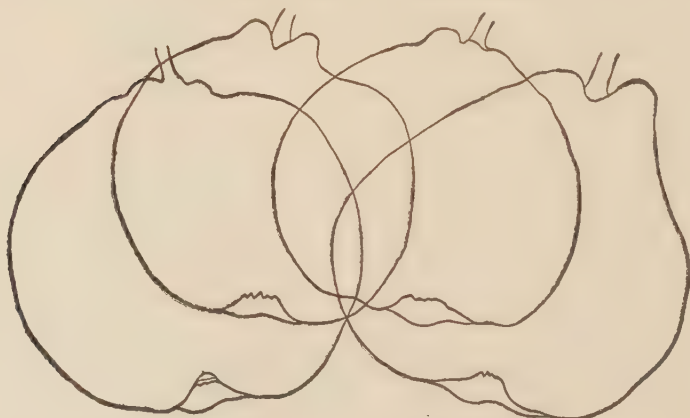


FIG. 787.—Johnston.

FIG. 788.—Champion.

Champion.* Large, obovate-pyriform, bright yellow; flesh tender, delicate flavor. Very prolific, bears young. Mid-season. Keeps well. Fig. 788.

Child. (California.) Medium, golden yellow, small core.

Chinese. Very large, oblong, rather coarse. Tree a vigorous grower, but late bearer. Does best South.

Fontenay or Paris. This is also cultivated extensively as stock for the pear. The fruit is not equal in quality to the Orange or Angers, more nearly resembling the Pear Quince in form and texture. The tree has more small side-shoots, grows thicker, and is less vigorous than the Angers. The Angers is further distinguished from the Fontenay by its downy shoots when young, darker wood, and short stout thorns.

The Japan and Chinese quinces are cultivated merely as ornamental shrubs. The fruit, which sets freely, is of no value for edible purposes, and as it has a highly aromatic fragrance is sometimes used to perfume clothes-drawers.

Fuller. Large, pyriform, usually with an abrupt small neck; surface irregular; lemon-yellow; basin wide and deep; flesh tender and good.

Johnson. Large, roundish-oblate, compressed at stem; greenish-yellow, downy in depression; dots small, green; cavity broad, nearly level; basin large, angular, deep; flesh yellowish, juicy, mild. Very good. Pennsylvania. Fig. 787.

Meech.* (Meech's Prolific.) Large, obscure-pyriform, golden yellow; very fragrant, good flavor. Bears early—very productive. Mid-season. An excellent variety. Fig. 790. Connecticut.

Orange.* (Apple.) Large, some sub-varieties quite large, roundish; somewhat irregular, with a small and very short neck at the base; surface of a fine golden color; flesh firm, stewing rather tender, of excellent flavor. Ripens soon after mid-autumn. Leaves oval. Tree productive if well cultivated. Fig. 789. Massachusetts.

This is the most common sort, and by continual propagation of seedlings several sub-varieties have been produced, varying slightly in coarseness or firmness of texture, size and form. The largest sometimes weighs a pound.

Pear. (Oblong or Pyriform Quince.) Size medium or rather large, pyriform, body roundish-oblong, neck about one-half or one-third the length of the body; skin rather dull rich yellow; flesh firm, tough, dry, with a high flavor, stewing less tender than the Orange quince. Ripens late in autumn, and hence adapted to distant marketing. Leaves oblong-ovate. A moderate bearer. Fig. 791.



FIG. 791.—Pear Quince.

Portugal. Quite large, oblong pyriform, largest at the middle and tapering to each end; yellow; flesh more juicy and less harsh than the other varieties. Stews well, and becomes a fine purple or deep crimson when cooked. The fruit is rather superior in quality, but the value of the variety

is much lessened by its unproductiveness. It does not strike readily from cuttings.

Rea.* (Rea's Mammoth, Rea's Seedling.) Fruit resembles the Orange, but from one-third to one-half larger, and of excellent quality. Tree a very strong grower, with large dark foliage. Early. Origin, Coxsackie, N. Y.

Van Deman. Above medium, truncated oval, greenish-yellow, sub-acid; prolific, good.

Wist. (Wist's Mammoth.) Very large, round, yellow, fine flavor,
A California seedling of the Orange Quince.

CHAPTER XXXIII.

THE RASPBERRY.

PROPAGATION.—The varieties which have originated from the red-fruited species are usually increased with great facility by suckers; but plants with better roots may be obtained by planting under glass, with a mild bottom heat, cuttings of the roots an inch or more in length. The American Blackcap and its varieties (*Rubus occidentalis*) are propagated readily by layers, the tips of the recurved branches when slightly buried soon taking root. This layering may be done in August or September, the tips of the shoots having been nipped about midsummer, and when these branch and form tips bare of leaves, bury them in the soil at an angle of forty-five degrees, and they will form fine roots before winter. New varieties are raised from seeds, and come into bearing the second or third year.

The soil for the raspberry should be rich, and an admixture of swamp muck is useful. A strong, deep loam is the only soil from which a full crop may be expected every season. If sandy or gravelly, or a stiff, cold clay, it cannot be relied upon. But the most important requisite is *depth*, only to be attained by deep ploughing or trenching, which will go far toward affording a remedy for any natural defect of the soil. The more tender varieties may be raised on higher, drier, and firmer spots of ground, where they are less liable to severe frosts.

The stems of the raspberry are biennial, the canes growing the first season and bearing fruit the second, after which they die, and the new ones take their places. As soon as growth ceases and the leaves drop, the old canes should therefore be cut away. When the new canes of the blackcap kinds have reached a sufficient height, the tips should be pinched off, to prevent their growing taller, which will cause them to be-

come stout and thick, and to send out side-shoots, which in turn should also be pinched back when they have grown a foot or so in length, being shorter above and longer below. Figs. 792, 793. With the Cap varieties they should not be more than two and a half feet high, which will obviate the necessity of staking. The Antwerps may be pinched back at



FIG. 792.—Poor Canes of Cuthbert with high laterals.



FIG. 793.—Good Canes of Cuthbert with low laterals.

three or four feet, but usually this is omitted, in which case they need stakes. The height should vary with the vigor of the plant, strong plants requiring more height. When suckers are numerous they must be cut away when they first appear at the surface, or they will enfeeble the plants. Four or five canes are enough to leave for each stool. The Antwerps and their varieties require the support of staking—which may be effected as shown in Fig. 794, or by means of wires stretched between stakes as in Fig. 795.

In many parts of the Northern States, some tender varieties need winter protection. This is easily given by covering the stems, when prostrate, very thinly with earth; placing a

small mound of earth against the bottom of the stems before laying them down, to bend upon and prevent breaking. This covering is removed early in spring. It will be found to prove very useful even when not necessary to prevent winter-killing, by rendering the crop larger and more certain.

A plantation of raspberries will continue in bearing five or



FIG. 794.—Staked Canes.



FIG. 795.—Wired Canes.

six years, when it should be renewed. If it remain longer, the fruit becomes small, and the crop gradually declines. Nearly the same varieties succeed in the different States of the Union. The foreign or Antwerp raspberries are worthless in most places South.

PLANTING FOR MARKET.

William Parry, who cultivates extensive plantations of the raspberry near Philadelphia, gives the following directions for their management:

“Plough and prepare the ground as for potatoes or other crops; mark the rows six feet apart, and set the plants three feet distant in the rows, requiring about twenty-five hundred plants to the acre. The tops should be cut down to within a few inches of the ground, that the roots may become well established before they are required to supply nourishment for long tops of green foliage. Carrots or potatoes may, with advantage, be grown between the rows the first year, after which the raspberries will require the whole space. Stir the ground frequently with horse and cultivator, to keep down grass and weeds, being careful during the warm, dry weather not to disturb the small roots feeding near the surface, by deep culture near to the plants. The raspberries should be carefully picked in small baskets not larger than pints, better less. Both baskets and crates should be ventilated, so as to allow the circulation of air to absorb the heat and moisture,

as they will bear transportation to market much better when cool and dry."

Good raspberry plantations will yield at the rate of fifty or sixty, and sometimes a hundred, bushels per acre.

PROPAGATING BY SEED,

to produce new varieties, is easily performed by washing the ripe seed from the pulp, mixing with damp sand, and sowing in autumn in fine soil, about half an inch deep, covering till early spring with a moderate coat of leaves or litter. They will produce young plants, which may be taken up and heeled-in late in autumn, and set out the second spring, after cutting down closely. The second and third year they will begin to bear and to exhibit the characteristics of the new sorts.

RULES FOR THE CULTURE OF RASPBERRIES.

1. Any good strong mellow soil, that will raise good corn, and which has been deeply pulverized, will raise good raspberries.

2. Set the plants in rows that will admit of free cultivating, say five to eight feet one way and two or three feet the other.

3. For blackcaps, pinch back early, or when the young canes are about two feet high, to keep the bushes snug and compact, and to obviate staking.

4. As the canes grow in one season and bear the next, cut the bearing canes away as soon as they drop their leaves, or never defer the work later than early the succeeding spring.

5. Suckering sorts, to bear well, must have the suckers hoed away when they first appear above ground, or be treated like weeds. Leave four to six new canes to each hill.

6. Increase the crop by clean, mellow culture, and if practicable by mulching for winter as well as for summer.

Most of the cultivated sorts of the raspberry are varieties derived from three species of the genus *Rubus*. The Antwerps, and others resembling them, are varieties of *Rubus Ideus*, the European Garden raspberry, which is distinguished by the stems being mostly rather tall and nearly erect, beset more or less with straight slender prickles, many of which are

mere bristles; and the plants increase by suckers. Most of these are rather tender. The Blackcap raspberries are varieties of *Rubus occidentalis*, an American species, the stems of which are armed with hooked prickles, but not with bristles, and are recurved so as to reach and take root at the tips, which touch or are buried in the ground. A few sorts are varieties of *Rubus strigosus*, or Wild Red Raspberry, which has upright stems, copiously furnished with bristles. The canes increase by suckers, and are quite hardy. A few cultivated sorts appear to be hybrids between some of these species.

CLASSIFICATION.

I. RUBUS IDÆUS—*European Origin.*

1. Red.
2. Yellow.

II. RUBUS OCCIDENTALIS—*American Blackcap Origin.*

1. Black.
2. Purple, red or yellow.

III. RUBUS STRIGOSUS—*Native Wild Red Raspberry.*

1. Red or purple.
2. Yellow or orange.

VARIETIES.

SECTION I.—EUROPEAN VARIETIES.

Red.

Belle de Fontenay.* Large, long conical; purplish-red, with a thin bloom; moderately firm, sub-acid, good. Canes stout, branching, suckering freely; hardy, and if kept clear of suckers, productive—bearing in autumn under favorable circumstances. French. Worthless in some localities.

Belle de Paluau. Large, roundish-conical, regular; bright crimson; moderately firm, juicy, very good. Canes strong, upright, very productive; spines short, purple. Requires winter protection. French.

Clarke.* Large, roundish conical; light crimson, rather soft, juicy, sweet, high-flavored. Berries sometimes imperfect. Canes stout

and branching, leaves large. Hardy, and succeeds on light soils. Suckers very freely. Productive. Early. Origin, New Haven, Conn. Fig. 796.

Fastolf.* Very large, obtuse conical, approaching roundish bright purplish-red; rather soft, high-flavored. Canes strong; nearly erect, branching, productive. English. Excellent for home use; too soft for distant market.



FIG. 796.—Clarke.

Fillbasket. (Northumberland Fillbasket.) Rather large, roundish; deep red; pleasant sub-acid, moderately good. Very bristly or spiny. English.

Franconia.* Large, obtuse conical; dark red; firm, with a rich sub-acid flavor. Canes strong, branching and spreading, moderately hardy, productive. A valuable market sort. French. *Nooniz*

closely resembles Franconia, and by many is supposed to be identical.

French. (Vice-President French.) Medium or rather large; roundish, crimson; firm, sweet or mild, very good. Productive and valuable. Philadelphia, Dr Brinckle.



FIG. 797.—Hudson River Antwerp.

Hudson River Antwerp.* Large, oblong conical; red, firm, with a very good flavor. Formerly cultivated with great success on the Hudson, rarely succeeds in other localities. Requires winter covering. Origin unknown, but supposed to have been imported. Distinct from Red Antwerp, or Old Red Antwerp, which has nearly round berries. Fig. 797.

Knevett Giant. Quite large, rounded conical; deep red; flesh

rather firm, adhering partly to the stalk. Canes strong, erect, spines few. Moderately hardy, productive. English.

Hornet. Quite large, ovate conical or roundish; firm, sub-acid, good. Canes strong, fruit-stems long. Productive. Fig. 798.

Large-Fruited Monthly. Medium or rather large, roundish; crimson; soft, sweet, juicy, of good quality. English.



FIG. 798.—Hornet.

Marvel of the Four Seasons. (Merveille des Quatre Saisons, October Red.) Medium, roundish-conical; bright red; rather soft, juicy, sweet, rich. Canes hardy, suckering profusely; spines or bristles short, purple. Under favorable circumstances bears till mid-autumn. French.

Meredeth Queen. Medium, red salmon, juicy. Canes vigorous, tender, suckers. Late.

Superlative.* Large, conical, dull red, fine dessert variety. Canes strong, vigorous. Hardy and productive.

Thompson Prolific. Large, round-conical, red, firm, good; early, vigorous, productive.

Yellow or Orange.

Col. Wilder. Large, roundish-conical; yellowish-white or cream-colored, slightly translucent; very productive, rather soft. Excellent. Canes strong, spines white. Philadelphia, Dr. Brinckle.

Orange.* (Brinckle's Orange.) Fruit large, nearly conical; clear orange-yellow, soft, juicy, sweet, rich, of excellent quality. Canes strong, branched, nearly hardy, very productive. The best of the yellow raspberries and the standard of excellence for quality in all raspberries. Mid-season. Philadelphia.

Vermont.* Medium, round-obtuse, pale yellow, downy, very soft, juicy, very good, productive. Late. Canes vigorous, prickly. Good. Vermont.

SECTION II.—AMERICAN BLACKCAPS.

Black.

American Blackcap. The common Blackcap, with its many variations, growing wild throughout the country, distinguished by its long recurved canes, and its regular, nearly round, or hemispherical berries, is the type of this division.

Conrath.* Very large, moderately firm, very good to best. Vigorous and productive. Ripens early and has a long season. Michigan. Promising.

Cumberland.* Very large, oval, glossy black, firm, of best quality. Season early. This is rapidly coming to be a standard. Pennsylvania.

Davison's Thornless. Medium in size, resembling the American Blackcap, but a week earlier; sweeter, and with canes nearly free from prickles. New York.

Doolittle.* (Joslyn's Improved, Improved Blackcap.) Full medium in size, black, sweet; a large variety of the wild Black Raspberry. Ripens early. Canes strong, with numerous prickles, productive. Has been extensively cultivated for market in many of the States. Ontario County, N. Y.

Eureka.* Medium to large, round, firm, juicy, of good quality. Early to mid-season. Has a long season. Highly esteemed for market.

Gregg.* Large; black, with some bloom; firm, quality moderate. Rather late. A productive and popular variety. Largely planted for market. Origin, Indiana.

Hilborn. Large, black, firm, juicy, sweet, good. Canes vigorous, productive. Mid-season, hardy. Ontario.

Hopkins. Full medium or large; black, with some bloom; rather soft, of excellent quality. Early. Growth strong; very productive. Missouri.

Kansas.* Large, round, black, firm, moderately juicy, hardy. Kansas.

Mammoth Cluster.* (McCormick, Large Miami.) Quite large, often four-fifths of an inch in diameter, flavor very good; canes strong, bearing very large crops—rather late. For many years the most popular of the Blackcap raspberries.

Mills (No. 15). Medium, black, firm, juicy, sweet, very productive, not hardy. New York.

Nemaha.* Large, black, productive; mid-season, hardy; said to be a few days earlier than Gregg, almost identical. Nebraska.

Ohio.* Medium in size; black with a moderate bloom; medium in quality. Canes unusually white. Profusely productive. Season early. Bears long shipping. This is the most popular berry for drying. It has large seeds and shrinks less in consequence than any other sort.

Ohio Everbearing. Resembles the American Blackcap, except that it has the habit of fruiting in autumn.

Older.* Medium, round, black, firm, juicy, prolific, hardy. Mid-season. Iowa.

Ontario. Large, nearly black, with thick whitish bloom, quality good. Rather early. Wayne County, N. Y.

Palmer.* Medium, black, very firm, nearly sweet, early, hardy. A good market berry. Ohio.

Souhegan.* Medium, black. Very hardy and productive. Valuable. Quite early. New Hampshire. A standard early variety.

Tyler.* Medium or below, round, firm, good. Early. Resembles Souhegan very closely. New York.

Purple, Red, or Yellow.

Catawissa. Hardly medium, rather flat; purplish-red, with a thick stem; sub-acid. Canes rather tender, producing a second crop in autumn. Cutting down the whole stool in spring causes the canes to bear till late in autumn. Valuable only for the garden. Pennsylvania.

Columbian.* Very large, purple, firm, moderately juicy, nearly sweet. Very prolific. Canes tall, vigorous. Resembles Shaffer's Colossal. New York. Mid-season. Said to be a seedling of Cuthbert.

Ganargua. Large, full and well rounded, reddish-purple, sub-acid, of good flavor. Canes very strong and vigorous, very prickly, bearing large crops, which ripen for several weeks. Ontario County, N. Y.

Golden Cap. Resembles the American Blackcap, except in the yellow color of its fruit. But little cultivated.

Golden Thornless. Quite large, dull yellow, firm, of moderate quality.



Purplecane. Rather small; dark dull red; soft, sweet, good. Canes long and strong, recurved. Resembles the Blackcaps in rooting at the tips of the canes, but differing in the character of the fruit. An old and popular variety, becoming superseded.

Seneca Blackcap. Rather large, dark shining purplish-black, very good in quality. Season medium. Canes vigorous and productive. One of the best of the Blackcaps.

Shaffer.* (Shaffer's Colossal.) Large; dull purple; soft, rather acid, moderate in flavor. Canes very large and tall, susceptible to anthracnose. Mid-season. Quite productive. An excellent canning variety. New York.

SECTION III.—NATIVE RED RASPBERRY.

Red or Purple.

Allen. Two or three sorts with this name were disseminated by L. F. Allen, of Black Rock, N. Y. The canes are strong, erect, very hardy, and sucker profusely. When kept free from suckers, they have produced good crops in some localities, of medium-sized, red, pleasant fruit.

Brandywine.* Rather large, bright scarlet, handsome; flesh firm, of good quality. A very popular early market sort in New Jersey and elsewhere. Canes low, and of a stout dwarf habit. Delaware.

Cuthbert.* Medium or large; scarlet-crimson; firm, juicy, very good. Canes vigorous, productive, rather hardy. One of the most popular and valuable. Mid-season. Riverdale, N. Y. Suckers freely.

Early Prolific. Medium, pale red, firm, juicy. Canes slender, few prickles, bright dark red, upright, vigorous, good.

Erie. (Gladstone.) Medium, red-crimson, soft, juicy, nearly sweet. Canes vigorous; second crop in autumn. Ohio.

Hersteine. Large, oblong-conic; bright crimson; flesh rather soft, quality very good. Canes strong, light green, spines few. Very productive. Philadelphia.

Kirtland. Medium, nearly round, red, moderate firm, sweet. Canes erect, nearly smooth, becoming pale red, suckering freely, hardy, productive, early. Fails in some localities.

Loudon.* Large, roundish-conical, red, firm, good. Wisconsin. S. Productive, hardy, good shipper.

Marlboro.* Large, roundish-conical, quite firm, red, of moderate quality. Vigorous, productive, and hardy. Quity early. New York. Desirable for market.

Miller.* Large, round, brilliant, red; firm, sprightly, very good. Early. Prolific and hardy. Delaware. Profitable on the Delaware peninsula; has only a local adaptation.

Montclair. Above medium, roundish; dark red; firm, of good quality. Suckers quite moderately. New Jersey. The variety named "Superb" resembles Montclair, but is more acid, crumbling, and the plant suckers more freely. Both are valuable.

New Rochelle. Rather large, obtuse-conical; dark or dull red; firm, sub-acid, moderately good. Valuable for canning. Canes

short-jointed and branched. Very productive. New Rochelle, N. Y.

Olathe. (Stagman No. 5.) Large, red, firm, juicy, productive. Canes slender, upright, vigorous.

Pearl. (Susqueco.) Medium, bright red, firm, of good quality. Canes low and of a dwarf habit resembling those of Brandywine, but the foliage comes out a week later in spring. A popular market sort near Philadelphia.

Philadelphia. Medium in size, nearly round, dark red, rather soft, sub-acid, of good but not rich flavor. Reddish-purple, with a few small spines, suckering moderately, bearing profuse crops. Hardy. This old variety is now nearly superseded.

Reliance. Medium, roundish, dark red, soft, quality good. Productive and very hardy. Season medium. An improved Philadelphia. New Jersey.

Royal Church. Large, round, red, moderately juicy, crumbly. Canes vigorous. Late. Hardy. Valuable only for home use.

Talbot. Medium, red, soft, juicy, sub-acid; very good. Canes vigorous.

Turner.* Full medium, roundish-conical; bright red; rather soft, sweet, pleasant. Canes vigorous. Very hardy and productive, suckering freely. Succeeds in nearly all localities. Mid-season. A little earlier than Cuthbert. Origin, Illinois.

Yellow or Orange.

Caroline. Medium, roundish-conical; salmon; soft, medium in quality. Handsome and productive. Early. It is propagated by tips and suckers. Origin, New York.

Golden Queen.* Large, round conic, light yellow, of very good quality. Seedling of Cuthbert and has all the good qualities of its parent. Varies in color. The most satisfactory of yellow varieties. For home use only. New Jersey.

Rubus Flavus. Medium, yellow berries. Canes very strong and high. A rank grower in Florida, where it is said to be the only raspberry which will thrive in that climate. Ripens in May.

CHAPTER XXXIV.

THE STRAWBERRY.

IN the cultivation of this early and delicious fruit, the requisites for success are chiefly:

1. A good, deep, rich soil.
2. Clean cultivation between the rows.
3. A renewal by planting as often as the vigor of the plants declines.
4. Selection of suitable varieties.

Soil.—Any deep, rich soil, which will afford fine crops of corn and potatoes, is well adapted to the cultivation of the strawberry. To be uniformly productive, it must be deeply trenched, either by the spade or by double ploughing, and well enriched with manure. Fine crops, it is true, may be obtained without trenching, but not in such excellence, profusion, or certainty, in all seasons. It rarely but sometimes happens that the soil is made too rich. The usual error is the reverse.

Strawberries are increased by rooted runners, which are usually thrown out from the plants soon after bearing, and they root late in summer and in autumn. These new plants succeed best if set out the following spring; but strong plants may be set out in autumn in light soils, or in heavier soils if the roots are carefully spread out and the earth trodden compactly.

Transplanting.—As far north as Albany, N. Y., setting out strawberries, either from well-rooted runners, or preferably from pot-plants, is now often performed during late August or early September. The plants will immediately take root, become well established before winter, and bear a good crop the following season. As the weather is often quite dry and warm at this time, precaution must be used to prevent the plants from perishing by drought. All the leaves, except the

small central ones, should be cut off, the roots kept wet and carefully spread out when set, as just described. The earth should be well settled about them with water, and mellow earth then drawn over the surface. A covering of fine manure, an inch or two in thickness, is then spread on the ground to preserve the moisture. It is only in cases of severe drought



FIG. 799.



FIG. 800.

that further watering is required. But when given it should be copious and repeated daily until the fresh leaves begin to expand. By this treatment scarcely a plant will be lost. If the work is done well they will bear a good crop the following season, and a heavy one the next. The well-rooted runners should be taken up, so as to secure all the fibres, lifting the roots out with a spade and shaking the earth carefully from them; if pulled severely by the hand the roots will be torn off. The older and dead leaves should be cut off from the plants, and the roots trimmed to about two and a half inches long. For ordinary field culture they may be set out with a dibble

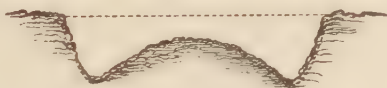


FIG. 801.

(Fig. 799), care having been previously taken to immerse the roots in mud to prevent drying. But for more finished or for garden culture, it is better to spread the roots out like the frame of an umbrella (Fig. 800), and set them in a hole broad enough, with a small mound in the centre, on which the spread roots rest and form a cap, as shown in Fig. 801.

Mr. F. Richards, of Freeport, N. Y., has invented an instrument for transplanting strawberries, which does the work ex-

peditionously and well. Fig. 802 represents the "excavator," Fig. 803 the "transplanter," and Fig. 804 the "ejector."



FIG. 802.



FIG. 804.



FIG. 803.

Treading the earth firmly about the plants when set lessens the liability to winter-killing.

A spontaneous renewal of plants may be effected by allowing runners to fill up the spaces between the rows, and then spading in the old rows. By thus filling alternate spaces in two successive years, an annual supply of fruit is afforded. This method of renewal has not been generally adopted.

Mulching among the plants, to keep the berries from becoming soiled with earth, should not be omitted. Straw answers a good purpose, and is more easily and neatly applied, if chopped short, say two or three inches. Rye straw, threshed by hand, will lie more smoothly than any other long straw. Applied in autumn, straw will protect from winter-killing, and may be renewed or retained in spring.

CULTIVATION OF STRAWBERRIES.—Clean cultivation is a most essential requisite. On a large scale, it may be very cheaply accomplished by a horse and cultivator, the rows being about three feet apart, and the plants a foot to a foot and a half in the rows. The treatment may be varied with circumstances, provided the great leading requisite is constantly kept in view, namely, *to allow no weeds to get above the surface*. This is the great cardinal essential, which must not be departed from. After the plantation is set out in clean, well-prepared soil, stir the ground often enough to destroy the sprouting weeds before they get to the light. The work may be then done with less than a tenth of the labor required after the weeds are several inches high; and all the labor of this fre-

quent stirring is more than repaid by the increased growth and vigor given to the plants, to say nothing about the weeds. If the plantation is small, the work may be done with a garden rake; if large, with a one-horse cultivator, or, perhaps better, with a fine-toothed one-horse harrow. If this is attended to thoroughly through autumn, the plantation may be mulched at the beginning of winter with straw. It will be better, especially for heavy soils, to remove the mulching in spring and mellow the surface one or more times before the plants blossom. This may be done by raking the mulch into every alternate row, and then, after the denuded spaces are stirred, to rake it back again and do the other rows. The mulch being replaced by flowering-time, the berries will be kept clean. Some cultivators, who have small plantations, do not disturb the mulch in spring, but loosen the soil through it with a pronged hoe—but whatever course is adopted, see that the weeds do not grow.

Strawberry Runners.—The formation of runners exhausts and checks the plants more than a dense mass of weeds. If you wish them to become strong, and bear large, excellent fruit, and plenty of it, keep the runners cut off, and repeat the operation once a week through the summer. Begin the work as soon as the plants *begin* to form runners, and not after they have sent them out in profusion—which is usually immediately after bearing-time. If intended for increase, and to form new beds, a small portion of the bed may be permitted to run and root. Some varieties will often bear profusely for a single season, even when the plants run thickly together; others, and more particularly the larger sorts, must be cleared of runners and kept well cultivated, or they will bear small crops.

Strawberries are injured in winter by severe winds, and by the successive heaving of freezing and thawing. They will always start earlier and fresher when covered. Sometimes snow will be an ample protection, but it must not be relied on. A thin coating of straw, evergreen boughs, or even corn-stalks, will shield and protect the surface of the ground, but it should not be applied till winter is close at hand, and after the ground is frozen hard is not too late. Do not forget to loosen up this mulching very early the next spring, and stir and mellow the soil.

Early Strawberries.—The following method has been successfully tried in some places: Cover a good, well-managed, clean bed of strawberries, the runners of which have been kept off, so as to form large, vigorous stools, with dry forest leaves early in winter, three or four inches thick. Remove these leaves in February in the Middle States, and in March in the North, and place over the plants a frame with sash. Bank the sides with leaves, and cover the sash in severe weather. The plants will start early, and give ripe fruit at the usual blooming time. Airing and water must not be neglected.

For garden culture it is most convenient to provide beds about five and a half feet wide, with paths two feet wide between them. Four rows are then set in each bed, a foot and a half apart, and the outer six inches from the edges of the bed, as shown in this diagram:



The plants may be about a foot apart in the rows. This arrangement allows the picking of the berries from the paths on each side without treading on the beds, the distance to the second or inner rows being only two feet. If the ground is more limited, beds two feet and a half wide may be made and but two rows planted, as in the diagram below:



In setting out strawberry-plants, the following rules may be observed: 1. Use well-rooted one-year plants. 2. Make the rows straight and parallel by a stretched cord. 3. Take up in a moist time if practicable. 4. In a dry time water the plants well before taking up. 5. Dip the roots in thin mud before

setting. 6. If watered after setting, finish by drawing on mel-low surface earth, and avoid covering the crown. 7. Plants set at midsummer should have the surface about them covered with fine manure an inch deep, to keep it moist and prevent crusting.

SELECTION OF VARIETIES.—Independently of fine quality, the selection of suitable varieties is of great importance. Some sorts, celebrated and highly recommended, will not yield a tenth part of the crop afforded by others. The most productive, among which the Crescent is conspicuous, have yielded at the rate of one hundred, and often two hundred bushels per acre; the ground, at the period of ripening, glowing with the dense red clusters, which nearly cover the surface; while on some foreign varieties the fruit is so thinly scattered and imperfect that whole square feet are destitute of fine specimens. It must constantly be remembered that no fruit is so influenced by soil and other conditions as the strawberry. Varieties which in our locality are nearly everything that could be desired are almost valueless in others. In all cases where large numbers of plants are to be set out, the experience of the State Agricultural Experiment Station should be availed of.

STAMINATE AND PISTILLATE SORTS.

As the productive qualities of strawberries depend so essentially on the presence of the *stamens* and *pistils*, some attention to this part of the subject becomes indispensable to their successful culture.

Modern cultivators divide all strawberries into two distinct classes, one being termed *staminate* (or "male"), in which the stamens are fully developed and possess the power of fertilizing the germ; and the other being termed *pistillate* (or "female"), in which the stamens are abortive, or so small and imperfectly developed that they fail to accomplish fertilization. In this work it is deemed advisable to designate the two as "perfect" and "imperfect." Figs 805 and 806 represent the usual appearance of these two kinds of flowers; and Figs. 807 and 808 enlarged portions of the same, Fig. 808 exhibiting a part of the flower of the Large Early Scarlet, and Fig.

807 the same of Hovey's Seedling; *a* being the stamens, and *b* the pistils. By the use of a hand lens it will be found that the former is abundantly supplied with pollen or fertilizing dust, while the latter is nearly or totally destitute. Hence



FIG. 805.—Perfect Flower.



FIG. 806.—Imperfect Flower.

Hovey's Seedling, or any other pistillate variety, can never, or but very imperfectly, fertilize its own flowers, and the impregnation must be derived from a staminate sort.



FIG. 807.



FIG. 808.

In planting strawberry beds, it is important, therefore, to know the character of the flowers. Nothing is easier than to distinguish the two when in blossom. This distinction is given in the *arrangement of varieties* which follows. About one-quarter staminate are usually regarded as abundant for fertilizing a bed of pistillates. To prevent intermixture of the two sorts by runners, they may be planted in alternate strips,

as indicated by the following diagram, S representing staminate and P pistillate varieties:

P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S S S S
P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S	P P P P	<i>Path.</i> S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S
P P P P	S	P P P P	S	P P P P	S S S S

In selecting two varieties for this purpose, perfect fertilization requires that their season of flowering should be nearly at the same time. Hence early and late flowering sorts will not succeed well together for this purpose. Nearly all sorts most commonly cultivated at the present time are staminate, and do not require this arrangement of beds for fertilization.

VARIETIES.

ARRANGEMENT.

CLASS I.—SCARLET AND PINE STRAWBERRIES.

Scarlet strawberries have small flowers; leaves rather long, thin, and light green, sharply serrate; fruit bright color, acid or subacid, seed deeply sunk. Pine strawberries are characterized by rather large flowers, leaves broad, dark green, sometimes obtuse; fruit large, not acid, rather smooth, seeds little sunk. These two sorts have been much hybridized and crossed, until it is now difficult to assign many varieties to either separately.

Section I.—Flowers Perfect.

Section II.—Flowers Imperfect.

CLASS II.—ALPINE AND WOOD STRAWBERRIES.

Flowers rather small, perfect; leaves small, thin, light green; fruit small sweet, parting freely from the calyx.

CLASS III.—HAUTOBOIS STRAWBERRIES.

Leaves large, pale green, on tall stalks; fruit-stalk tall and erect; fruit dull purplish.

CLASS IV.—CHILI STRAWBERRIES.

Leaves very hairy, thick, obtusely serrate; fruit very large, pale, insipid. Tender.

CLASS V.—GREEN STRAWBERRIES.

Leaves light green, plaited; flesh solid. Of little value.

Of classes II., III., IV., and V. but few sorts are in cultivation, and as they are of little value no description of varieties will be given.

VARIETIES OF SCARLET AND PINE STRAWBERRIES.

It is not intended that the following list should be considered to embrace all the varieties of strawberries which have been introduced in the United States. The ease with which new sorts may be produced has given rise to an almost endless number.

Those only which have become standards of the older sorts, and the most promising of the newer ones are here described. It is repeated that no other fruit is so influenced in all its characteristics by soil, climate, and cultivation as the strawberry.

Section I. Flowers Perfect.

Aroma. Large, irregular conical; light red, moderately firm; not very productive; berries uniform in size. A late variety from Kansas.

Bederwood.* (Racster.) Medium roundish, conical, rather soft, sweet, light vermillion. Prolific; a good pollinizer; does well South. Early.

Belle. (Lady Finger.) Very large, long round, necked; glossy red or crimson; flesh firm, reddish-white. Vigorous, hardy, productive.

Beverly. Medium, good form and color; plants healthy and fairly productive; deep crimson; sub-acid. Berries become smaller toward the last. Mid-season. Resembles Morris' Prolific. Massachusetts.

Bidwell. Medium to large, long conical, often uneven; bright crimson; flesh firm; rich, sub-acid. Early. Requires rich soil and cutting of runners. Light bearer. Fails in many localities, valuable in others. Michigan.

Bismarck. Large, round conic, light scarlet, moderately firm, of

good quality. Needs high culture. Often too soft and light colored for market, but good for home use. Massachusetts.

Bomba. Large, dark crimson, rather soft. Good for home use. Mid-season.

Brandywine.* Medium to large, regular conical, sometimes irregular; dark scarlet; firm, somewhat acid. Moderately productive. Mid-season. Runners very numerous. Good market berry. Does best in clay soil. Pennsylvania.

Charles Downing.* Rather large, ovate-conical, regular; color deep scarlet; flesh firm, juicy, rich. Plant vigorous and productive. Valuable in nearly all localities. Mid-season. Raised by J. S. Downer, Kentucky. Old.

Clyde.* Large, long conic, light crimson to dark scarlet, firm, good. Mid-season. Throws out few runners, and sets more fruit than it can carry out except under high culture. Kansas.

Crawford. Large, long conical; dark glossy red; firm, sub-acid. Productive. Good market berry.

Cumberland.* (Cumberland Triumph.) Large, broad conical, very regular; light red; rather soft; of a mild and very good quality. A vigorous grower and good bearer. Mid-season. Carlisle, Pa.

Cyclone. Medium, regular conical; size uniform; scarlet; moderately firm; fair quality; foliage vigorous, but not very abundant. Moderately productive.

Excelsior. Very vigorous and healthy; berries large, long conic, bright scarlet, juicy, firm, good. Very early. Arkansas.

Forest Rose. Medium or large, rounded conical; scarlet; moderately firm, rich, and rather sweet. Its value is nearly destroyed by the failure of the foliage in many localities. Ohio.

Gandy.* (Gandy's Prize, First Season.) Large, regular conical; bright glossy crimson; firm; fine flavor; vigorous, prolific. A fine late sort. Good shipper. New York.

Hoffman. Medium, conical, crimson, hard. Mid-season. Will ship almost any distance, but no value otherwise. South Carolina.

James Vick. Medium, regular; sprightly, very good. Profusely productive. Requires rich culture. Missouri.

Jessie.* Very large, often wedge-shaped; bright scarlet; good. Mid-season. Requires careful cultivation. Wisconsin.

Jucunda. Large, conical, rarely coxcombed; glossy, brilliant scarlet; seeds prominent; flesh white, with pale salmon centre, firm, juicy; of moderate quality—often poor. A profuse bearer on some soils, and valuable for market, bearing long conveyance. Plant rather tender. Late. Old.

Jucunda Improved. Large, regular conical, bright crimson, firm. Vigorous, prolific. A good berry.

Lady Thompson.* Averaging large, ovate, light crimson, firm, good. Largely grown in the South for early market. North Carolina.

Leader. Large, obtuse conical; firm; good. Early. Does best in clay soil.

Lennig's White. Large, ovate conical; whitish tinged with red; flesh soft, tender, juicy, with a rich pineapple flavor. Delicious in quality, but a poor bearer. Pennsylvania. Old.

Logan. Large, round conical; scarlet; moderately firm. Early to mid-season.

Lovett.* (Lovett's Early.) Large, round, flattened conical, crimson; firm, sub-acid. Early to mid-season. A good pollinizer. Kentucky.

Margaret.* Large, broad conical, dark crimson, firm, good. Mid-season. A good shipper. Inclined to mildew. Ohio.

Marshall.* Large, round conical; dark glossy crimson, running into the flesh; firm, rich, best; strong grower. Moderately productive; needs high cultivation in clay soil. Mid-season. Massachusetts.

Mary. Very large, long irregular conical; dark crimson; acid, rich. Productive. Keeps long on plants. Mid-season to late.

Meek. (Meek's Early.) Small, round, dark crimson; flesh red, sub-acid. Early. Needs clay soil. Maryland.

Mitchel's Early.* Small, conical; dull vermilion, soft. Vigorous, prolific. Very early. Extensively used as a pollinizer. Arkansas.

Miner.* (Miner's Prolific, Miner's Great Prolific.) Medium, roundish conical, slightly uneven; dark crimson; moderately firm, of fair quality. Rather late. Plant hardy, vigorous, productive; valuable. Best with hill culture. New Jersey.

Mrs. Cleveland. Large, long conical, irregular; bright vermilion; rather soft; fine flavor. Productive. Good home sort.

Muskingum. Large, obtuse conical, sometimes corkscrewed; bright glossy red; flesh red. Prolific under good cultivation. Mid-season to late. A good variety to plant with Bubach.

Nicanor. Medium, ovate, conical, uniform and regular; scarlet, flesh rather firm, rich and of fine quality. Plant productive and hardy; valuable for its earliness. Raised by Ellwanger & Barry, Rochester, N. Y. Old.

Nick Ohmer. Large, ovate-conic, bright crimson, firm, very good. Mid-season. Handsome. Promising.

Parker Earle.* Medium, long conical; light crimson; slightly necked; flesh red, sub-acid. Strong plants; very productive. Season late. Needs rich soil. Texas.

Wilder.* (President Wilder.) Large, ovate-conical, regular; bright scarlet; flesh firm, sweet, rich. Often quite productive. Dorchester, Mass. A European variety known as President Wilder is distinguished from this by the long neck of the fruit. Old.

Princess.* Very large, roundish; light crimson; excellent flavor. Vigorous, not productive. Minnesota. Fine for home garden.

Princeton. (Princeton Chief.) Medium roundish; dark red; berries on stout stalks; very sweet. Vigorous, productive. Mid-season.

Ridgeway. Very vigorous and productive. Large, round conic, crimson, firm, fine quality. One of the best of the newer varieties.

Rio. (Thompson's No. 9.) Medium, irregular, ovate; bright red, or scarlet; quality fair. Very early.

Seth Boyden. (Boyden's No. 30.) Very large, roundish conical, regular, often with a short neck; bright crimson; rather soft on the surface; juicy, rich, sub-acid. Plant vigorous and productive. Newark, N. J. Old.

Sharpless.* Large, often irregular and coxcombed or flat conical; dark scarlet; firm, rich, very good. Season medium. Widely known for its size and productiveness. Fails in some localities. Pennsylvania.

Shuckless. (Mt. Vernon.) Large, obtuse conical; light crimson; quality fair; parts from the calyx in picking. Mid-season.

Triomphe de Gand. Quite large (often two inches longest diameter under good cultivation), sometimes irregularly roundish, more frequently much coxcombed; crimson; flesh rather firm, with a mild, sweet, very good flavor. Plant vigorous, hardy, and moderately productive—requiring good cultivation and the removal of runners. Belgian. Old.

William Belt.* Vigorous, setting an abundance of runners. Berries large to very large, many of the first fruits coxcombed, later ones conical, crimson, firm, very good to best. Productive. Rusts badly. Mid-season. One of the best for home use. Ohio.

Wilson.* (Wilson's Albany, Albany Seedling.) Medium to small, broadly conic, pointed; deep crimson; flesh crimson, firm, brisk acid, becoming rich and agreeable when fully ripe. Exceedingly productive and hardy, and succeeds well as a market sort at the North, South, and West. Although an old variety, it is still one of the popular standard sorts. It is a good pollinizer for imperfect plants. New York.

Wolverton.* Large, regular, round conical, bright crimson; flavor good. Vigorous, productive. Mid-season to late. Canada.

Yale. Medium, round conical, dark crimson, running into the flesh; flavor good. Requires good cultivation. Very late.

Section II. Flowers Imperfect.

Barton's Eclipse. Very large, round conical; glossy dark red; medium fine. Vigorous, productive.

Bubach.* (No. 5.) Large, round oblong, sometimes wedge-shaped, dark scarlet, sweet; quality fair; moderately firm, hollow. A handsome berry. Requires good cultivation. Early to mid-season. Good nearby-market berry. Illinois.

Burr's New Pine. Medium or large, an inch to an inch and a fourth in diameter, roundish conical, smooth, even, and regular; seeds scarcely sunk; color pale red; flesh whitish pink, very tender, flavor fine. Prolific and with perfect berries. Still very popular. Old. Illinois.

Carrie. Large long conic, dark scarlet, medium firm, of good quality. Mid-season. Resembles Haverland. Valued for market in some parts of New York. Virginia.

Crescent.* Medium or large, roundish conical; bright scarlet; moderately good, rather soft. A profuse bearer. Rich culture improves its quality, and sometimes changes it to a staminate. Connecticut.

Glen Mary.* Very large, heart-shaped, like Sharpless, of which it is probably a seedling. Crimson, fine quality, mid-season. Pennsylvania. A standard berry for market and one of the best for forcing. Glen Mary is perfect-flowered after the first few blooms.

Green Prolific. Large, roundish; orange scarlet. Good, rather acid; valuable. A thrifty grower, productive. New Jersey.

Greenville. Large, obtuse conical; glossy crimson; flesh reddish. Vigorous, productive. Mid-season. Ohio.

Haverland.* Medium, large, long conical; light scarlet; large trusses. Mid-season. Very productive. New Jersey.

Hovey's Seedling. Quite large, roundish oval, approaching conical; color deep shining scarlet; seeds slightly sunk; firm, rather rich, good. Very large, showy, productive, and hence fine for market. Season medium. With high culture it has been made very productive. Once well-known and popular, now almost entirely superseded. Old.

Jersey Queen. Large, roundish oblate; crimson, handsome; firm. Late. Usually a moderate bearer. New Jersey.

Jewell. Large, flat conical; crimson-scarlet; firm, solid, good. Does best in heavy rich soil.

Pacific.* (Great Pacific.) Large, irregular, lobed; dark red; firm. Good market berry. Early. South.

Sample.* Medium large, round-conic, or irregular, bright scarlet, firm, of high quality. Late.

Shuster's Gem. Medium, globular; scarlet; soft, sweet, good. Plants vigorous, productive. Mid-season.

Timbrell.* Large, globular; dark crimson; firm, rich, juicy. Plants vigorous. Very late. An excellent all-around berry.

Warfield. Medium, round conical; dark crimson; flesh firm, red, mild acid. Claimed to be very productive. Good shipper and one of the best for canning. Early. Illinois.

CHAPTER XXXV.

WILD AND UNCLASSIFIED FRUITS.

BUFFALO BERRY.

THE Buffalo Berry (*Shepherdia argentea*), as its name indicates, is a native of the far West. It is a rather straggling, open shrub of eight to twelve feet, with alternate ovate leaves, silvery on both sides. The fruit, usually bright red (there is a yellow variety), one-quarter inch in diameter, thickly lines the branches and makes it quite ornamental. The berries are not edible until after hard freezing, and then have a brisk, pleasant sub-acid flavor. They are said to be good for jams and sauces. They will hang on the bushes all winter, if the birds permit.

ELEAGNUS LONGIPES.

This fruit is a native of Japan, and when first introduced into this country was called Goumi. The shrub grows to four or five feet in height and blooms in May. Its flowers are small, greenish-yellow, and not conspicuous; it sets a large quantity of berries thickly strung along the branches, smooth or ribbed, oval and dark green, until ripe in July and August, when they change to a beautiful bright glossy crimson profusely dotted with golden yellow spots—one of the most beautiful of berries. Until fully matured they are decidedly astringent, but when ripe their flavor is spicy and good. Mr. William Falconer says a very good jelly may be made from them.

The bush is very ornamental at all times, and when covered with berries is uncommonly so. Unfortunately the birds seem



FIG. 809.—Buffalo Berry.

inordinately fond of them and appear to know exactly the day they become just ripe, and on that day they will completely strip even a large bunch of bushes of every perfect berry. If they are wanted to eat, therefore, they must be protected with netting.

Until within a few years, there has been no certainty of



FIG. 810.—*Eleagnus longipes*.

obtaining this plant from the nurserymen, but frequently *E. argentea* or *E. umbellatus* have been substituted for it, both of which, while ornamental shrubs and producing berries, are inferior in the latter respect to *E. longipes*.

HUCKLEBERRIES.

The so-called Huckleberries belong to the Heath family, and to the two genera *Gaylussacia* and *Vaccinium*. They are all found growing wild from Maine to the Mississippi and south to the Gulf. The bushes vary greatly in size, from six inches to ten feet or more, and the fruit differs as greatly, from juicy and sweet to dry and insipid. Immense tracts, especially of *G. resinosa*, the common black huckleberry of our markets,

are found usually in clearings on hills, all over the United States north of Georgia and Alabama. The gathering of this crop annually furnishes employment to large numbers of men, women, and children of the poorer class, from whom it is purchased by farmers and others, who daily meet the pickers at an appointed spot, and by them the berries are boxed and forwarded to market.

Some attempts have been made to cultivate this berry.



FIG. 811.—Clump of Black Huckleberries.

Joseph Meehan says that if cut down one-half and transplanted to the garden in the spring few will die, and they will bear the second year, with promise of good crops thereafter. It is further stated by others that with all the varieties the size of the fruit increases under good cultivation.

The growing of the huckleberry is one of the few as yet undeveloped fields of horticulture, and seems to promise satisfactory returns to the patient investigator.

While there are a number of species belonging to the two genera mentioned, the following only are worth consideration as edible.

VARIETIES.

Bilberry.* (*Vaccinium cæspitosum*.) Grows on a very low bush three to six inches high, in sandy, hilly ground; berry large, light blue, round; good.

Black Huckleberry. (*Gaylussacia resinosa*.) Grows on dry sandy, rocky, hilly woods and clearings, one to three feet high. There are a number of varieties, some globular, some pear-shaped; jet black, glossy, seeds very large; not very good. The common huckleberry of the markets.

Canada Blueberry. (*V. Canadensis*.) Grows in dry sandy and rocky soil; berries round, blue, good.

Highbush Blueberry.* (*Dangleberry. G. frondosa*.) Grows in open places by the woods, along fences, in damp, sandy soil, three to six feet high; berries roundish-oblate, large, dark blue; seeds small; good.

Highbush Huckleberry. (*V. corymbosum*.) Grows in wet or swampy ground five to fifteen feet high; berry good size, blue or black; flavor sub-acid.

Low Blueberry.* (*V. Pennsylvanicum*.) Grows six to fifteen inches high in sandy soil; very large, light blue; sweet and good.

JUNE BERRY.

Of late years nurserymen have been advertising this as a valuable promising fruit. The sort most commonly known is a tree growing from ten to thirty or more feet high (*Amelanchier Canadensis*) usually called Service-tree or May cherry. The improved dwarf June berry is simply the wild variety *A. alnifolia* or *A. Botryapium*, the former being indigenous to the North and West, and the latter to Eastern States. There are also still other kinds. The shrubby or dwarf June berries are hard-wooded plants, which produce roots and stems but slowly. These are not difficult to transplant, and if left undisturbed will soon produce quantities of dark purple berries about the size of large currants. The flowers appear before the leaves in long, rather loose clusters, and are quite large and clear white. As ornamental shrubbery they are worthy

of a place in any lawn. They grow from three to five feet high. Two varieties, Success and Mammoth, are said to be larger and more productive than the wild forms. Both are dwarf.



FIG. 812.—June Berry.

MEDLARS.

Probably a native of Persia. On its own roots it forms a low-growing tree, considerably planted in England, more rarely in the United States. The fruit is from one to one and a half inches in diameter, of peculiar shape, as shown in the illustration. Color, brown russet. It is gathered after the first severe frost, the stems dipped in strong brine, and after

being laid in layers in shallow trays, it is covered with wet bran and placed in a cool room to soften, or, technically, "blet." The medlar is not sufficiently good to make it worth raising, except as a curiosity. Four varieties are grown in



FIG. 813.—Medlars.

England and on the Continent. Dutch, the largest; **Monstrous**, large, vigorous, new; **Royal**, prolific, brisk flavor; and **Nottingham**, the smallest in size, prolific, and the best.

PAW-PAW (*Asimina triloba*).

This tree is indigenous to the Central United States valleys, where it grows in thickets along the river-banks. It attains a height of from twelve to fifteen feet, densely clothed with large, obovate-lanceolate leaves. It blossoms in the latitude of New York in May before the foliage makes its appearance. The flowers are of a dark violet color, about an inch in diameter, in clusters of from two to six or eight. The fruit is a peculiar-looking affair, cylindrical, with obtuse ends, from three to five inches long and from one and a half to two inches thick, brown, with dark patches when fully ripe. The flesh is

a deep creamy yellow, very soft, a little gritty, very sweet. Embedded in this flesh are from two to six or eight large glossy black seeds.

While a most luxuriant grower and profuse bearer in its native soil, it is not hardy north of New York, and even there it is often winter-killed. It is nevertheless an ornamental tree for the lawn or garden, and well worth cultivating for this



FIG. 814.—Paw-Paw.
(Reduced one-half in diameter.)

merit as well as for its curious fruit, which is much liked by some.

The young trees can be obtained of nurserymen. The paw-paw is diæcious, and if fruit is desired it must always be stipulated that the stock purchased shall have borne fruit. The necessity of transplanting trees of such age and size enhances the difficulty of successfully establishing them. In the towns along the Ohio and Mississippi and their tributaries, in the fall of the year, the paw-paw is plentifully exposed for sale, but as it is too soft for transportation it is never seen far from the places where it grows.

STRAWBERRY-RASPBERRY.

Rubus rosæfolius.—Commonly supposed to be a hybrid of the two fruits whose diphthongue name it bears. It is, however, a distinct species from the Himalayas. It is one of the most beautiful of fruits. The berries resemble an enormous raspberry, from one inch to an inch and a half in diameter. The plant is slender, branched, about two feet high, the stems armed from end to end with the sharpest spines. It is utterly worthless to eat, but the berry is so beautiful that it is well worth cultivating for table decoration. It requires heavy clay soil. When started, it is difficult as a weed to keep within bounds. Entirely hardy up to latitude 42°.

JAPANESE WINEBERRY.

Rubus phænicolasius.—The English name gives its native habitat. The canes grow from ten to fifteen feet long, rooting, and thus propagating itself, from their tips. These canes are thickly covered with very conspicuous purplish-red hairs. Leaves five to seven inches long, simple or trifoliate; leaflets crenate, serrate, downy white on the under side. The flowers are pinkish-white; the fruit is similar to other small raspberries, of a lively scarlet; flavor sprightly, sub acid, very refreshing. Birds, especially robins and cat birds, are so fond of them that it is hardly possible to gather any quantity, even from a pretty large bed. It is worth cultivation simply for ornament, and is entirely hardy.

Part Three.

SUBTROPICAL FRUITS

BY

E. H. HART

FEDERAL POINT, FLORIDA

CHAPTER XXXVI.

CITRUS FRUITS.

THE ORANGE.

THE citrus-tree is supposed to have originally travelled from China to India, and thence gradually spread over the world to all countries having a climate sufficiently mild for its growth. The citron was known on the shores of the Mediterranean long before the sweet orange, and some scriptural allusions to the apple are supposed to refer to it. The Seville orange, or bigarrade, is reported to have been brought from the East by the Moors, who established large plantations of it about Seville in Spain; hence the name. From Spain this orange was brought to Florida by the early Spanish settlers, and the Indians, becoming very fond of it, carried quantities about with them on their canoe excursions to be eaten at their camps on the shores of the numerous streams of that well-watered country. The seeds, dropping upon the ground, soon germinated, and from them sprang the famous sour-orange groves, which in time became so vast and numerous as to lead many to believe the sour orange an indigenous product.

In Florida all sweet oranges were formerly called China oranges, to distinguish them from the Sevilles, and perhaps also in allusion to the country of their origin. Of late great attention has been paid to improvement of quality by selection, cross-fertilization, and scientific cultivation, and when the efforts in these directions shall equal those expended upon the fruits of temperate climes, a greater demand and higher appreciation will follow. The renaissance of the industry in Florida at the close of the civil war, combined with the popular estimation of the fruit grown in that peninsula, resulted in an increase of production in twenty-five years, from almost nothing up to about five million boxes per annum.

Under favorable conditions the orange-tree lives and continues fruitful to a great age. Its tenacity of life is wonderful. Trunks of large trees, after lying for weeks in the hold of a vessel as ballast, have struck root and renewed their lives when planted out and cared for. Others killed to the ground by fire or frost, and showing no signs of life for a year or

more, have at length sprouted and regained their former size. Unless actually diseased, there would seem to be hardly any limit to their recuperative power. Trees that had remained stationary for many years in the shade of crowded thickets, or stunted and dwarfed by aggressive grass and weeds, when removed to a congenial spot and cared for have immediately responded by growing off apace.

Evolution of the Orange.

The orange, originally a berry about the size of a marble, bitter and full of seeds, has been brought to its present astonishing development in size and flavor by the patient efforts of cultivators from the most remote times. The different types and varieties are the result of careful selection of seeds from fruit possessing the qualities most desired, and many variations have come from crossings with the lime and citron. Climate and soil have also exercised a powerful influence, after a term of years changing a variety so much as to render difficult its identification with the original. When various kinds of citrus are intermingled in one grove, distinguishing characteristics are sometimes completely wiped out. In extreme cases almost the whole crop on a tree of an elongated variety has become spherical or even flattened, and *vice versa*; navel oranges lost their special mark, and the navel seal appeared on nearly all the fruit of a China-orange tree. Navel oranges, properly seedless, have acquired seeds from the pollen of adjoining seedy varieties; also what appeared to be oranges have been found on lemon-trees and the reverse. Although these changes may not be sufficiently common to forbid the intermingling of different trees in a commercial grove, yet they are common enough to prove how easily and rapidly changes in types and varieties may be brought about; the necessity of care in the selection of seed; and also what some botanists have denied, namely, that the influence of pollination appears directly in the flesh of the fruit instead of affecting merely the seed. When quick results in crossing are desired, it may be remembered that the influence of strange pollen deposited upon the stigma will also affect for a short time several buds behind and under the blossom, and before this influence ceases these

buds may be transferred to another tree, grown, and fruited in a year or two. If seeds of the hybrid fruit be planted, buds from the young seedling when in its fourth or fifth leaf may be skilfully inserted into the sprout of a bearing tree and fruited in the same space of time.

That the bud influences the stock is proved by the more rapid expansion of the latter, after being worked with a faster-growing variety, as when a lemon is set into a sour orange, and also by the appearance below the union, in some rare instances, of adventitious growths of the same kind as the inserted bud. The writer has a large lemon-tree, worked on a sour orange, a foot above the ground and killed down by the late freeze. From a large side root of this sour-orange stock, about two feet distant from the trunk, are growing a couple of vigorous lemon-sprouts, showing the subtle and potent influence of the dominant top. The orange is also improved by double working, as, for instance, when a lemon is grown upon a sour stock and budded one or more times with an orange. Each successive change assists in refinement of flavor and elimination of seed and thorn. Some of these things may be deemed heresies, and possibly they are as applied to less tractable subjects than the citrus, certainly one of the most remarkably docile of fruit-trees.

PROPAGATION.

Seeds.—The orange is usually increased by seeds, which should be planted an inch deep, and about an inch apart, soon after removal from the fruit, and before they become too dry to germinate. If the seed cannot be planted at once, it may be mixed with moist sand, which will preserve its vitality for a long time, provided it be kept cool enough not to sprout. The young plants may be started in boxes filled with moderately rich earth, or in beds in open ground, covering the seeds with loose or sifted soil, which should not be allowed to become dry or crusted over. Shelter from the scorching beams of the sun in the hottest weather, and also from frosts, by screens of coarse cloth or lattice-work, with a liberal but not excessive supply of water, is necessary after they begin to grow. Moles may be kept from the seed-beds by an enclosure

of boards placed on edge and sunk deeply enough to exclude them.

The following year the young plants may be transferred to the nursery rows, to be budded when of convenient size, or grown as seedlings until large enough for removal to the grove. Where seedlings are preferred the seed should be selected from the best sweet oranges, growing by themselves apart from lemon, citron, or bigarrade trees, so that the quality may not be debased by intermixture with these. Some kinds long grown by themselves, like the Bisry orange of Sidon, almost invariably come true to kind. Generally there will be more or less variation in a grove of seedlings, though scarcely apparent to a superficial observer, and if the seeds have come of reputable stock, all will produce a fair quality of fruit. Sweet seedlings usually begin to bear six or eight years after planting. Ten inches or a foot apart in the nursery rows is a good distance, and to get an even stand only the strong thrifty plants should be used, leaving the weakly ones until they become larger.

Budding and Grafting.—Although the orange can be successfully grafted, budding is much preferred, and the operation is performed the same as with other trees, excepting that more nicety is required. To prevent the entrance of water, the shield is inserted into a cross-cut at the bottom of the vertical slit and pushed upward. Only the lower corners of the vertical slit are raised, and the shield is made to open its own way. The shield should extend well above and below the bud, be sliced off smoothly with plenty of substance, and lie flat and snugly against the wood. The bandage may be of soft cotton twine, the turns of which are passed closely around and drawn tight. This is better than husks or bast, which are apt to loosen and the bud perishes. Better still are strips of muslin dipped in beeswax. These can be wound around so as to cover all, entirely excluding air and water, and then it is immaterial whether the cross-cut be made above or below. The addition of oils or fats to the wax in very hot weather is liable to cause souring of the sap, which is fatal. Large stocks may be twig-budded or grafted, by inserting between bark and wood at the excised end several slender twigs cut thin and sloping and pushed well

down, or a twig may be inserted between bark and wood in a diagonal incision at the side without cutting off the top.

The fruitfulness and stamina of the future tree, in a great measure, depend upon the selection of the buds from which it is produced. It is commonly believed that a bud from a bearing branch will bear sooner and more abundantly than one from a watershoot or sucker. This theory is scarcely borne out by experience. A watershoot, after running up to the top of the tree and putting out branches, will often be found the next year weighted down with masses of fruit. Therefore a bud from a watershoot is just as likely to be fertile, and more likely to be vigorous, the same as a bud from near the end of a thrifty shoot. Buds near the base of a scion are apt to make trees with fewer thorns, but less vigorous. Again, buds from fruit-bearing twigs early in the season may be slightly affected by strange pollen absorbed through the bloom. This accounts for cases of so-called bud variation. Therefore buds from a thrifty non-bearing branch of a fruitful tree are the best guarantee of vigor and productiveness. No doubt there are a few buds on every tree that are naturally and unaccountably barren, and when these are unfortunately used an unprofitable tree is the result. Here and there such a one may be found in every grove. For these there is no remedy but working over again.

The sour orange, or bigarrade, begins to bear at an earlier age than the sweet, and is naturally a smaller tree. Having a hardy constitution, it is commonly preferred as a stock. It begins to bear in two or three years after budding, and, as it is only by this means that distinct varieties can be perpetuated, budding is always resorted to where speedy results and uniformity are desired. Fruit from budded trees grades higher and carries better than that from seedlings, for the reason that only the best kinds are selected. By repeated budding, the thorns, always numerous in a natural tree, finally almost entirely disappear. Thornless trees are always desirable, because the wounds inflicted upon the fruit by these sharp points, especially during high winds, cause great loss by decay both before and after gathering. Budded trees appear to be as hardy and long-lived as any.

Stocks of grape-fruit, lemon, and the larger limes may

sometimes be used to advantage. A small orange, lacking flavor, is improved in size, quality, and fruitfulness by being worked upon these free growers, but like them becomes tender as regards ability to bear frost. To ensure safety from total loss in a killing freeze, budding close to the root is now practised. Some prefer the sweet seedling for a stock, especially in soils where it is not liable to "dieback" and *mal de goma*, arguing that, if killed down by frost, it can be allowed to grow up again without the trouble and delay of budding. The sweet seedling in such soils, when used as a stock for varieties, attains a great size and large bearing capacity.

For dwarfing the orange and lemon, *C. Otaheite* and *C. trifoliata* are used. The former, brought into France in 1815, is a nearly thornless evergreen shrub, with pendulous branches and glossy leaves, and quite tender.

C. trifoliata, one of the original wild forms, is a deciduous shrub with trifoliate leaves, exceedingly thorny, and hardy enough to answer for hedges in a temperate climate. On either of the above the orange or lemon makes an elegant compact bush, freely producing large crops of fine fruit. On *trifoliata*, in the open ground, it becomes a small tree, capable, when dormant, of enduring a greater degree of cold than otherwise. Such trees are adapted to exposed situations, and those along the northern edge of orange latitudes. They are hardy only while resting; during active growth the resistant powers of all are much the same.

Where nursery trees were not to be had and a start must be made from the seed, groves have been quickly established by planting several plump seeds where each tree was to stand, and after they had grown a few months pulling out all plants but the best ones. Such trees, unchecked by removal, and each a survival of the fittest, have often fruited in three or four years.

Transplanting.—The orange bears transplanting well, and, if skilfully done, trees of any size can be moved without risk of loss. Where the roots have been closely cut off, recovery is better if most of the tops are pruned away. The roots must not be exposed to the sun nor allowed to become dry. After setting, the earth should be closely packed by hand or by pouring in water. Thus treated, the largest trees will begin

growing and bearing at once, and in a few years regain tops of their former size. Trees carrying half-grown fruit have been moved and retained the crop till maturity.

Immediately after the civil war, when the planting of groves began in Florida, there was no nursery stock to be had. Accordingly, trees were taken from the extensive thickets of wild oranges existing here and there all over the State. Before removal they were cut back to four or five feet, and all the roots severed a few inches from the stump. As they had grown closely, with little room for expansion, many, still small, might have been a hundred years old, and yet these apparently stunted trees, after being transplanted and budded, grew off handsomely, becoming large and productive in time. Others, topped and budded where they stood, with roots intact, the surrounding bushes being cleared away, were transformed even sooner. Being evergreen, transplanting may be done any time of year, but the cooler weather of winter, when growth has nearly or entirely ceased, is considered safest.

New roots begin to push out about three weeks after lifting, followed in a week or two more by the swelling of the buds. Besides being supplied with water, if the weather is very hot and dry, they should be shaded or wrapped till growth begins. Before movement of sap and root action is established, there is no power to resist the heat from the direct beams of the sun, which may cook and destroy them. Mulching is of great assistance in keeping the soil loose, moist, and cool until the recovery of the tree, and preventing the drying up of the tender rootlets.

Trees should never be set deeper than they originally grew. On damp or low-lying soils they ought to be a few inches higher, and the earth drawn up to them, leaving a sloping bed with a depression in the middle to carry off surplus water that might accumulate during heavy rains. If the ground is loose they will settle a little, for which allowance should be made. Set too deep, they will never thrive nor grow much until raised, or waited upon until new collar-roots form. The ends of all tap-roots should be cut off smoothly, also the laterals, which should be drawn out straight, and clean soil tightly packed around them. Contact with strong fertilizers and fermenting manures is highly objectionable, and likely to breed disease.

These should be worked into the soil beyond if used at all, to be sought after and appropriated as needed. The hungry tree will scent out a compost or muck-heap many feet away, and, in an incredibly short time, fill it with the yellow root-lets. The tap-root starts first, sending down a whorl of slender threads, which soon coalesce in a single spike, replacing the severed portion. Nothing is lost by pruning away most of the branches, cutting back the top severely. A new head will form more quickly and the growth be more rapid and healthy if the leafage is diminished to correspond with the shortened roots.

Cuttings and Layers.—All of the citrus tribe grow readily from cuttings or layers, particularly lemons and citrons, the branches of which often strike root as they rest upon the ground, weighed down with fruit. It might reasonably be supposed that seedlings of the lemon and citron would live longer and have better stamina than cuttings and layers, but the latter appear to do equally well, and have the advantage, if killed to the ground, of growing up true to kind without the trouble of grafting. The orange may be quickly propagated from the side-roots of large trees, which, having been cut through and air and light admitted to the severed portions, soon throw out rank sprouts and can be dug up as separate plants. This method and also by layers is a common mode of increasing the Otaheite for dwarfing.

Soil.—The orange readily accommodates itself to any reasonably fertile soil, and although it will grow and produce fair crops on land too poor for grain, no other fruit-tree responds more readily to generous treatment. It is found thriving in the driest situations, wherever the roots can extend down to the moisture beneath, and it also flourishes on alluvial soil subject at times to overflow, provided the water does not stand too long and is kept cool by the shade of overhanging forests. During seasons of active growth, an abundance of water, either from rain or irrigation, is a necessity. In many cases, besides what is drawn up by the roots from hidden sources, copious dews or the seepage of artesian wells are of material assistance. Dr. Bennett mentions an extensive grove in an alluvial valley of Sardinia, through which runs a never-failing rivulet of mountain water. No manure is ever given,

and twice a week during summer the entire grove is flooded. As thus shown, the orange needs a well-watered situation, but it must be living or moving water; swampy or sodden soils are to be avoided, also those having an impervious layer of rock, or hardpan near the surface, particularly if charged with an excess of salt or iron. On loose and friable soils, underlaid with marly or phosphatic deposits, the growth is wonderfully luxuriant and the fruit of surpassing delicacy, oftentimes too delicate for shipment to a distant market.

All low and flat lands are more frosty. Trees on high ground often show little damage from a polar wave when those in the valleys below are badly hurt. But during the sweeping blizzards that destroyed the Florida groves, the intense and far-reaching cold was, if anything, more severe on elevations than in sheltered valleys. This, however, was an exceptional case. A body of water on the north or north-west side of a grove, wide and deep enough to retain heat, greatly lessens the rigor of cold winds, and a belt of dense timber on the east side, to keep off the morning sun for a few hours on a frosty morning, also mitigates the damage that might ensue from rapid thawing.

Fertilizers.—Closely connected with the subject of soil is that of fertilizers, by the understanding use of which almost any kind of an orange may be, as it were, manufactured to order. Free use of potash thickens and toughens the rind, giving the firmness and durability requisite to bear transportation and rough handling, but at the expense of saccharine qualities. The latter may be increased and acidulous properties modified by the use of more phosphoric acid. Highly nitrogenous applications give fruit surcharged with insipid juice, and cause a lush growth of wood that never properly ripens, inviting attacks of insects and fungi. Composts from the barnyard, or those containing much decomposing animal matter, must be used sparingly if at all. The most wholesome growth and finest-flavored fruit comes from judicious employment of the best high-grade commercial fertilizers. To keep up the productiveness of bearing groves, enormous quantities of these are applied, sometimes a ton to the acre every year, and in rare cases even more has been found profitable, or as much as the owner could afford to buy. No soil, however

fertile, could long keep up its strength when crops of two hundred and fifty to nearly four times that number of boxes of fruit are annually removed from it, unless the elements taken away are continually being restored. In the wild groves, where the entire product falls and is immediately resolved into original forms by decay, there is of course no impoverishment or deterioration.

The peculiar characteristics of an orange are also due, in great measure, to the season of its development and ripening. The superior excellence of the Florida product is well known. About the 1st of March the blossom opens. During the dry weather of April and May the superfluous setting falls off, and what remains progresses, under the fostering influences of heat and showers, to maturity by the last of autumn. The cool winter weather checks the flow of sap, the green rind assumes a brilliant golden hue, and the sharp acids become toned down and blended with a delightful intermingling of the saccharine. Evidently the conditions of climate and soil are eminently fitted and the changes of the seasons come just at the right time, to bring about these superlative qualities. But there are midsummer blooms whose fruit ripens the following summer, and it is a curious fact that this summer fruit, though subject to the same influences, but at different seasons as regards stages of growth, is every way inferior to the regular crop, and, instead of a ruddy golden yellow, never gets beyond a pale greenish tinge. The same has been observed in some tropical regions, where cool weather is unknown; hence it is evident that a low temperature at the ripening period contributes to perfection, and it is believed that the orange is best at its northern limit in this hemisphere. South of the equator the conditions would be reversed.

Distance of Planting.—The distance apart in the grove depends upon the kind of tree and character of soil. Sweet seedlings or buds on sweet stocks grow to a great size, and anywhere from thirty to forty feet will not be found too close in loose and deeply drained ground. On sour stocks twenty-five to thirty feet. On trifoliata still closer, and dwarfed on Otaheite no more than ten by ten. On heavy, low-lying, and wet land, trees attain less size and should be set nearer; say twenty by twenty for sweet stocks and sixteen by twenty for

sour. Such situations being more frosty, close planting creates denser shade, which not only mitigates the cold, but also breaks the force of high winds, besides keeping the ground cool and moist by checking evaporation. Fruit grown in the shade is of a more delicate texture and a clearer complexion than that exposed to the sun. Where plenty of space is advisable the trees become very large in time and the product correspondingly great per tree. Growers on high lands assert that they get more fruit per acre from trees fifty feet apart than from those nearer together. In some countries close planting seems to be the rule. For example, in the Sardinian grove alluded to, the trees, according to Dr. Bennett, are only eight or ten feet apart; and most of them very old, with trunks two or even three feet in diameter. The branches run up to a height of twenty feet, and form a dense canopy, which keeps the ground cool and moist, and the experience of centuries has satisfied the proprietors that this is the best plan. It was also found that seedlings were apt to die from limb-blight upon reaching maturity, while all the grafted trees were sound and healthy. Herman Melville, referring to a grove in Tahiti, says the trees formed a dense shade, spreading overhead a dark, rustling vault, in which nothing but leaves and fruit could be seen.

CULTIVATION.

The method of cultivation is a subject about which exists a great variety of opinions, and amid the many differences of soil, climate, and surroundings the treatment must, of course, be varied to suit each particular case. Nowhere do we find more beautiful fruit, nor brighter or more glossy foliage, than in many of the wild groves of Florida. Shielded from the fierce beams of the midsummer sun, from high winds and the severity of frosts by the intermingled and overarching forest trees, and fed by the decay of fallen leaves and branches, the conditions for a continued well-being are well-nigh perfect. Here nature provides a loose and friable soil, abounding in the elements of fertility, with protection from extremes of heat and cold, and as far as the artificial state of cultivated trees allows we will do well to imitate

nature. High lands deficient in humus should be kept stirred part of the year, and during warm and rainy weather grass or green crops may be allowed to grow, and then turned under to furnish the vegetable mould upon which the rootlets delight to feed. Except in soils where the roots strike deeply, ploughing must be shallow to avoid their mutilation. Low-lying and wet lands are better not ploughed at all. Mulching and an occasional superficial working over with the hoe or cultivator will keep the soil loose and moist, as in a state of nature. Our aim should be to secure a steady and moderate growth, slowly ripening up and hardening, which is more wholesome for the tree and better enables it to bear an extreme of frost. An abnormally rapid growth invites disease, insects, and damage from low temperature. The orange resents too much interference. "Let well enough alone," and "make haste slowly," are golden rules in orange-culture.

Pruning.—Pruning is sometimes necessary to get rid of long thorns, or to open up the inside for convenience in climbing about to gather the fruit, and to admit air and light moderately. It is well to cut off dead or sickly branches, and those that chafe against each other. Trees with tall, naked trunks are more readily hurt by frost and high winds; therefore while young they should be encouraged to branch out low. This does not interfere much with cultivation, for the plough should not be run too close, and the shade keeps down grass and weeds. As the top expands and thickens, these lower branches cease to be of service, and may be removed as having served their turn. The best time for pruning is in spring, when danger of frost is less and vital forces strongest. Late in summer it is more weakening, besides increasing the susceptibility to cold by setting the sap in motion. There is much unnecessary pruning done. Small twigs in the shade are continually dying and being succeeded by others more favorably situated. In a few weeks they become brittle and drop off, like leaves that have had their day. In the nursery more or less of clipping and pinching-back is needed to favor leading-shoots and bring the young trees into shape. Water-sprouts should be removed before they divert and absorb the energies of large trees.

FROST.

In many semi-tropical regions, where attention is paid to the orange, the arch enemy is frost. And yet it is not so much the degree of cold, as the condition of the tree at the time, which makes a fall of temperature harmful. At rest from growing, with no flow of sap and the bark clinging tightly to the wood, a tough old tree has been known to come out of a brief period, during which ten degrees were indicated by the mercury, with scarcely a scar. In the freeze of 1886 in Florida, a temperature of 17° at sunrise, rising to 32° at noon, and gradually dropping to below 20° by the next morning, and this repeated for four days, was what many old groves passed through with so little harm that eighteen months afterward they were holding larger crops than ever before. But a drop below 30° is more or less hazardous when the sap is flowing, and a few hours' exposure, especially if trees are young and growing freely, may burst the bark and kill them to the ground. Nothing is more sensitive than the tip of a growing shoot.

At the time of the freeze of February 7th, 1895, which killed down most of the orange-trees in Florida, except those in the extreme southern portion, the conditions were most unfavorable, aside from the severity of the cold, which registered 12° to 15° in many places—three degrees lower than in Boston—and destroyed forest growths considered hardy in the Carolinas. A frost of almost equal intensity had occurred six weeks previously, which caused all the foliage to drop, and during the interval between the two the sap had begun to flow, and young leaves and blossom-buds were appearing. In this tender condition, and unsheltered by protecting foliage, they fell an easy prey.

The devastation seems to have been greater than during a similar visitation sixty years before. At that time the trunks of some old trees were spared in places where this last frost made a clean sweep. Previous to 1835 there were bearing trees in St. Augustine of great size and capacity, which must have bordered upon one hundred years. Elderly people like to recall those days when the Ancient City was embowered in one vast grove, all yellow with ripening fruit, to an extent

never since regained. A previous killing freeze is recorded as having occurred in 1747, and it is a curious fact that all three of these fatal frosts fell upon the same date in February.

The trees killed by the recent freeze are mostly sprouting freely from the roots, and, if taken care of, will begin bearing in two or three years, and promise to regain their former size by another decade, if not sooner. But as some owners have neither the means nor courage to rebuild their groves, it will probably be longer before the previous output is reached.

Although the trees can bear the low temperatures before stated, the fruit cannot. Exposed to 25° for a few hours, the juice next the stem begins to evaporate, and a longer exposure will cause its total disappearance. Badly frozen oranges soon drop and decay, while many of those slightly touched will hang for several weeks in fair condition for eating, and may be sent to near-by markets. Those that are small and tight skinned often lose half or two-thirds of their juice, where the larger ones, having a loose and coarse rind, will become entirely dry, and light as puff-balls. The vitality of many of the seeds will also be destroyed.

An effectual protection against total destruction by frost consists in banking up earth around the stem as far as practicable, this to be removed when the danger is past. Should the top be killed down to this mound, the tree will at once sprout from the live wood with great vigor and begin to bear again in a year or two, whereas if killed to a level with the ground, its recovery would be much slower, if indeed it rallied at all. The boughs of pines or other evergreens laid among the branches afford some protection in a moderate freeze, but such precautions availed little in the intense cold weather in Florida during the month of February, 1895. It may be worth mentioning that, at the same time when all other citrus around them were destroyed, some whose growth had been checked a short time before by severe root-pruning came through with few signs of injury. Any top shade or scattering umbrageous trees mitigate the effects of lighter frosts to a considerable degree. In Europe and Northern India a latticed shelter is often built over the trees in exposed situations.

INSECTS.

Few trees are more liable to attacks of insects than members of the citrus tribe, but an inherent vigor makes them generally proof against lasting injury from this source. In a congenial soil, with favorable climatic conditions, the skilful cultivator feels little concern, knowing that where the parasitic enemies of any insect exist an undue increase of the latter is attended by a corresponding multiplication of the former, and thus is the balance of nature preserved. The use of insecticides is but a partial remedy, and without the aid of friendly parasites would, in many cases, prove inadequate. It is wise to apply the ounce of preventive and maintain a strict quarantine against the introduction of these insidious foes, and the wisdom of this is now being recognized by stringent laws imposing penalties against the admission of infected or infested plants.

One of the most widely distributed insects affecting the citrus in Florida is the Rust-Mite (*Phytops*). Almost too minute to be seen with the naked eye, it swarms in incredible numbers over the trees, and, attaching its beak to the fruit, sucks the juices of the peel, leaving it blackened and dry. Such fruit, commercially undesirable from a disfigured appearance, also loses much of the delightful aroma, but carries and keeps better, and the juices evaporate more slowly. On the other hand it is more readily injured by frost, which causes it to drop and decay, before any effects are shown upon the bright. So that, although some claim preference for a rusty orange, the presence of this mite is objectionable, as depreciating the market value of the fruit, as well as more or less affecting the health of the tree by a draft upon its strength. It is combated by spraying with a solution of sulphur and lime, or any other good insecticide, in May or June, before its migration to the fruit, and occasionally thereafter, to make "assurance double sure." Lime or sulphur dusted over the foliage while wet with dew or rain is also helpful.

The Red Spider, *Tetranychus sex maculatus*, or spotted mite, and several other similar mites, formerly inhabiting other growths, but of late emigrating to citrus-trees as the latter became common, do much harm by sucking the leaves, and

causing them to drop, thus retarding the growth and development of fruit and lessening the vitality of the tree. Water is the bane of these insects, which increase marvellously fast in times of drought, and correspondingly diminish during rainy periods. There is one species that thrives in the wet season. Kerosene emulsion and the sulphur or soda sprays are effective destroyers. A minute lady-bird, scarcely visible to the naked eye, has been found preying upon the red spider.

The Red Scale, *Aspidiotus ficus*, and Long Scale, *Mytilaspis Gloveri*, which fasten to the bark and leaves and feed upon the sap, are chiefly vulnerable when their larvæ are in motion in March or April, June or July, and September or October, and may be checked by the same preparations.

The White Fly, *Aleyrodes citrifolii*, has lately wrought much harm in the Florida groves, particularly in the far south. This insect breeds three times during the year, and should be attacked soon after hatching. The rosin washes are most effectual against it. Lately there has appeared a parasitic fungus, *Aschersonia*, which attacks and destroys the larvæ of the white fly. Trees which had suffered from the pest for years and nearly succumbed are now recovering since the spread of this fungus among them, which, it is thought, will finally put an end to the trouble.

The insects above mentioned have proved the most troublesome of any hitherto dealt with. There are other scales, of minor importance, which may be fought in the same manner whenever numerous enough to be harmful. The most effective method of killing scale or other insects, so far discovered, is by fumigation with hydrocyanic gas, as practised in California. The gas is generated under a tent enclosing the tree, and an exposure of half an hour has been found to destroy all insect life. The trouble and expense of applying may prevent its use except in desperate cases.

The well-known Mealy Bug, *Coccus adonidum*, often seen upon the pineapple, and generally to be found in the blossom-end of a ripe pomegranate, has sometimes been quite troublesome to the orange. Besides weakening the tree, most of the insects spoken of leave a smutty deposit, sometimes to such an extent as to unfit the fruit for market unless previously cleaned, which involves much time and labor.

The decay and falling off of ripe oranges is sometimes caused by attacks of members of the Mitre or Soldier-Bug family, *Asopus*, which collect in large numbers upon the fruit and suck its juices. These bugs usually breed upon cotton, the cow-pea, and cucurbitaceous plants, migrating from these to the orange-trees. They also puncture tender shoots, causing the ends to wilt and die. The best way to avoid them is not to allow the plants upon which they breed to grow among the orange-trees. It is well to observe here that strong soda and potash sprays must be used with caution while the fruit is small, or it may be rendered insipid and worthless from the absorption of these substances, which neutralize its acids and destroy the sprightly flavor.

It is a common opinion that the harm done by a severe winter has its compensations in the extinction of injurious insects. There is little foundation for this belief. The ravages of scale have often been more noticeable after rigorous seasons than before; so we may infer either that a lowered vitality has rendered the trees more susceptible, or that the friendly parasites have been diminished.

DISEASES.

Among diseases of the citrus, *mal de goma* is one of the most serious. This is manifested by a gummy exudation at the base of the trunk, followed by decay of the bark; the malady gradually extending to the roots, and, if not checked, often causing the death of the tree. It is supposed to arise from a variety of causes, such as the close contact of fermenting manures or corrosive substances; a rich soil saturated with moisture, or highly nitrogenous fertilizers. Sometimes when the cause ceases to exist the tree recovers of itself. Removal of the soil about the diseased roots and exposure to the air are recommended; also the cutting away of diseased bark and wood and the application of a wash of sulphurous acid. Trees on a friendly soil, nourished with a well-balanced fertilizer, are seldom affected, and the sweet orange is more susceptible than the sour or bigarrade.

Limb-blight is an obscure disease, the origin of which is still doubtful. The leaves wilt, small twigs perish gradually, and the tree falls into a decline and finally dies. There seems

to be no specific remedy, but trees showing these symptoms have, in some instances, been fully restored by digging a trench all round two or three feet from the trunk, filling in with fresh soil mixed with manure, and pruning away nearly all the top. Doubtless some cases of limb-blight are the result of overcropping, and exhaustion of necessary elements. It seems to affect adjacent trees, but whether contagious has not yet been definitely settled. Removal and burning of affected limbs and extirpation of badly diseased trees are recommended, but as some forms of blight may proceed from preventable causes it might be well to go slowly in the execution of such heroic measures. The matter is being studied by experts and will be better understood after further investigation.

Dieback.—Another trouble of the grower, and perhaps the most common, is a condition called "dieback." This may be recognized by the damping-off of the ends of growing shoots, which are often unduly angular, distorted, curving downward, fairly bursting with crude sap, and disfigured by rusty red patches of exuding gum. There is a mighty effort at rapid growth; a constant advance and retrogression. Bearing trees either produce no fruit, or else set a heavy crop, which assumes a whity-green color, becomes scabby, cracks open and drops, and any that reaches maturity is insipid and worthless. It must be considered a condition rather than a disease, a dyspeptic state arising from over-stimulation or one-sided fertilizers. It is also caused by too deep planting, a wet and steaming soil, one that holds some noxious element, or is underlaid near the surface with impervious rock or hardpan. The grower must form a diagnosis of his own peculiar case, in order to know what remedy to apply or what cause to remove. If trees have been planted too deep they must be raised; sodden soils may have shallow cultivation, or top shade, or lie in grass during the hot and rainy season; fermenting and over-stimulating fertilizers must be avoided and noxious elements neutralized. On a soil naturally adapted to the orange and judiciously fertilized and cultivated dieback is unknown.

The same causes, variously affecting other plants, have been noticed. Pear and apple trees by a poultry-house or manure-pile have been killed outright; banana-plants have grown

wondrously, set a few fruits, and then decayed at the base and fallen over; and even palms, perhaps the most resistant of all to such influences, have pushed up several leaves at once, with leaflets distorted and folded back. It must be remembered that the orange, although one of the toughest of trees in many ways, is yet one of the most discriminating and sensitive about what comes in contact with its roots. Strong brine will kill it, and an instance is remembered where a little London purple, spilled on the ground and dissolved by the rain, caused three vigorous old trees standing by to wilt and die in a few days. If strong manures must be used, the danger is lessened or entirely obviated by depositing them in holes or shallow pits dug here and there among the trees, instead of broadcasting over the surface.

The *Scab* is a minute fungus badly affecting the bigarrade and lemon, and to a less degree the lime and citron. It has hitherto troubled the sweet orange very little. It may have previously existed in Florida, but did not become general until a short time before the great freeze of 1886. It is appearing again in spite of the hopes of its extinction by the last killing down of the trees. Before its first appearance there was no difficulty in growing the most beautiful lemons, with smooth satiny skins, fully equal to any in the world. But now a large proportion are too rough and warty for marketing, and the leaves are distorted and covered with scars and excrescences. The growth of the trees does not seem to be greatly checked, nor the acid of the fruit injured, but it is terribly disfiguring. As the lemon is desired as much for the fragrant peel as for the juice, it will be readily seen how largely such an affection must detract from its value. Many Italian lemons show marks of the same or something similar. The copper sprays applied several times a year have been tried with the result of a mitigation but not an eradication of the evil.

Mosses and Lichens growing upon the trunks and limbs may be scrubbed away with a stiff brush, but any good fungicide will cause them to die and drop off. Although they may not do much harm while an abundance of moisture prevails, yet, rooting as they do in the bark, many small branches are strangled and the general health of the trees affected in times of drought.

SELECTION OF VARIETIES.

In establishing a commercial grove profit is, of course, the first consideration, and amid the great number of varieties, much perplexity arises in deciding which are best suited to that end. Some of those most esteemed, and commanding the highest price, may be unprofitable by reason of an inherent defect, such as shy bearing, lack of stamina, too great delicacy to bear carriage, or a marked susceptibility to cold. Therefore in making a selection none should be used but those combining, in the greatest degree productiveness, vigor, firmness, high quality, and resistant power. Near the northern limit early sorts, that may be gathered before the approach of frost, are most desirable. In milder latitudes a succession will enable the work of harvesting to go on uninterruptedly from October till May and even later, rendering the grower independent of gluts and depressed markets, which may happen some of the time but not all the time. As regards quality, there is perhaps less choice among varieties of the orange, nearly all of which are good, than among other fruits, many of which are indifferent and some positively bad. A seedling apple or pear may be wretchedly poor, but a seedling orange is almost sure to be excellent, and not infrequently extra fine. Differences of exterior are also less broad, so the uneducated are apt to think an orange is an orange the world over, until they learn to detect its nice distinctions and recognize its subtile flavors. A number of favorites in Florida and California since the renaissance are seedlings of local reputation, selected and named for their all-round excellence, and full of the vigor of youth. Some celebrities of world-wide fame have been imported. One of the most famous of these last is the Malta family, the type of which is widely known as Maltese Blood. This is readily distinguished by the rounded and flattened young leaves, quite different from the elongated and curled appearance of those of other sorts. The flecks and splashes of sanguine hue in the pulp, which is sometimes entirely crimsoned, were formerly supposed to have come from budding upon the pomegranate, but this is a

gross error. It is reasonably believed they are the result of crossing, at a remote period, with the red shaddock.

VARIETIES.

MALTA ORANGES.

Amory Maltese Oval. A superb variety of robust growth, and a good cropper. Foreign.

Fortuna. Robust growing and hardy; spherical or sometimes flattened. Holds up late; very prolific and desirable.

Jaffa. Closely resembles Majorca every way, excepting that it is sweeter and a more regular bearer. Foreign.

Jaffa Blood. Sport of Jaffa; colored inside like the type, which it closely resembles and fully equals. Florida.

Majorca. Tree and fruit similar to Maltese Blood, without intermingling color. Pulp fine-grained and tender, with unsurpassed refreshing vinous qualities. More round in shape, with a thinner rind; a good keeper and shipper. Florida.

Maltese Blood. Tree of moderate size, almost thornless, rounded, and compact; rather sensitive to cold and needs high cultivation to ensure regular crops. Fruit oval, few seeds; exterior often marked with patches of rosy red; very attractive in appearance; flavor exceedingly piquant and delicious, giving it a reputation for quality second to none. Foreign.

Maltese Egg. Oval in shape; runs from 176 to 225 size; fair grower and heavy bearer. One of the finest of this strain in quality. Foreign.

Tephi. An improved Jaffa, modified by pollination. Excellent grower and bearer and of highest quality.

Besides those mentioned above are other Maltas, as **Oblong**, **Late**, **Long**, and several unnamed, all having the same general characteristics and good points. Most of them were imported from Europe by Gen. H. S. Sanford and Mr. Charles Amory.

Maltese Oval. (Garey's Mediterranean.) Sweet. Generally classed with the Maltas, but of distinct foliage; is a favorite with florists on account of its habit of exuberant blooming. Fruit oblong, slightly flattened at the stem, of excellent quality and keeps very late; apt to split on young trees. Needs high cultivation and abundant feeding.

Valencia. (Valencia Late.) Growth and habit closely resemble the above; also shape and general appearance of fruit, which is smoother, more acid, and ripens later. Valuable for late shipping. Foreign.

PORTUGAL ORANGES.

The type of these is spherical or slightly flattened, with marked vinous properties, probably acquired long ago from the wild lime, and usually not becoming fully ripe till mid-winter or spring. The most desirable variety in this class is

Mediterranean. Fruit large to medium, very solid and with few seeds, ripening late; tree thornless, of dwarf habit, inclined to overbear. Formerly very popular but now superseded by Washington Navel.

Others are **Pernambuco, Circassian, Duroi, Botelha, Peerless, Rio, Nicaragua, Tahiti, Rivers' Prolific, Beach No. 5,** and several kinds of **St. Michael**, all good growers and bearers, not differing greatly from each other, and valuable for marketing.

SWEET CHINA ORANGES.

Typical form oval or elongated rather than flattened; saccharine qualities strongly marked; become palatable early, and seem to show remote admixture with the sweet citron. Among these are:

Early Oblong, St. Michael Egg, and Pride of Malta. These are of oval shape with a roughened exterior and very little acid, and may be shipped early. Hardly so insipid as the following.

Seville. (Sweet Seville.) Spherical in shape; bears young and abundantly; so utterly devoid of acid that it may be used as soon as it fills with juice, even before the rind colors. Good for early shipments when all others are sour. Foreign.

Whittaker, Foster, Boone, Nonpareil, Parson, Centennial, Homosassa, and Magnum Bonum are all selected seedlings of extended reputation, strong growing and early ripening, combining the sweetness of the China with the sprightliness of the Portugal. To these may be added **Cunningham, Arcadia, Pineapple, Indian River,** and **Stark** or **De Bary Seedless**, all favorites and of extra fine quality.

There is a class of blood oranges, suggesting the China and Portugal rather than the Malta, called Round Bloods. The best of these are the **Amory**, which is of very high quality, vigorous, prolific, and hardy, and the **Italian**. Also **Imperial**, which is early, and **De Colmar**, and **St. Michael Blood**, which are later, besides some unnamed and equally promising seedlings.

Brazilian. Brought to Florida from Louisiana a dozen years ago by Rev. W. P. Gardner of Fort Myers, and but little known as yet among orange growers. Highly recommended for vigor and productiveness, with fruit of very fine quality, which hangs upon the tree without deterioration until midsummer.

Hart. (Hart's Late.) (Tardiff, Brown of Thos. Rivers.) A high-class fruit with few seeds, slightly oblong, pale yellow, thin rind, dark pulp with a brisk and racy flavor. This is largely planted for its lateness, hanging throughout the summer without deterioration. Hart, Paper-Rind, Prata, and White show decided admixture of lemon.

Joppa. Originated in 1877 from seed procured by A. B. Chapman of San Gabriel, Cal., from Palestine. Tree thornless and strong growing. Fruit oblong, almost seedless, with thin rind, solid, juicy, and very sweet. Can be gathered early or left on the tree till midsummer. Said to be the heaviest orange grown and one of the most beautiful, and while some regard the flavor as hardly first-rate, others praise it highly and think that when better known it will be very largely planted.

Paper-Rind. (Paper-Rind St. Michael's Fruit.) Light colored, small, round, rather seedy, pungent, and aromatic, flesh very firm and juicy. Ripens late and keeps well on the trees. Tree dwarf, medium thorny, productive. Very desirable. Has more specific gravity than almost any orange known; a favorite for market in California.

Prata. (Silver Orange.) A favorite in some European markets; is as light-colored in pulp and rind as a lemon; piquant and delicious.

White. Similar, but coarser and sweeter.

Many of the choicest varieties of oranges owe their peculiar excellence to admixtures, more or less remote, with some other member of the citrus family. Hybrids of *C. nobilis* and *C. decumana* are said to have developed a superlative refinement in certain lines, indicating that when in the course of time the efforts of experimenters shall have been crowned with a fruit combining in harmonious proportions the best qualities of all, the result will be an orange worth having.

NAVEL ORANGES.

This famous orange, broadly marked at the apex with an umbilical appearance, belongs to the China section, having the same slender and thornless habit, with few seeds and a sweet pulp dashed with a subtle blending of acid, giving a combination of rare delicacy. Originally from Brazil, it was

cultivated in Florida many years ago, becoming extinct there, or nearly so by the great freeze of 1835. About 1874 it was again restored, under the name of **Washington Navel** or **Bahia**, in trees imported from South America and sent out by the Department of Agriculture at Washington. Fruit large, solid, very juicy, high flavored. Only in exceptional cases are seeds found. Tree prolific, often beginning to bear one year from the bud. Its magnificent size, smooth and silky exterior, delicious flavor, and total absence of seed, have raised it at once to pre-eminence. In California it seems satisfactorily productive, but in Florida, unless budded on lime or lemon, or the flow of sap interrupted by partial girdling, the crops are often too light to be remunerative. It is to-day the leading commercial variety of America.

The same objection generally exists in other navels, such as **Sustain**, **Rivers**, **Egyptian**, **Australian**, **Malta**, some from Continental gardens, and a native seedling—the **Double Imperial**. Flowers are freely produced, but nearly all fall off. By some the trouble has been attributed to exhaustion from too free blooming, or from lack of pollen, which cannot be the cause, seeing that one variety, a cross of Botelha and Sustain, and as free a bloomer as any, always sets, and carries such an enormous crop as to paralyze its energies and arrest its growth.

MANDARIN ORANGES (*CITRUS NOBILIS*).

This appears to be of a race entirely distinct from the common orange, and may have been identical with or sprung from the *Süntara* group, either indigenous to the northeastern border of India, or introduced there long ago from southern China. The leaves and blossoms are smaller than those of the common orange, and exhale a peculiar aromatic odor. The branches are slender and the fruit is flattened, with segments loosely adhering, forming a hole in the centre, and enclosed in a smooth and glossy rind of a saffron yellow, easily detached. When fully ripe it is exceedingly juicy and melting, and has become a favorite in European and American markets, where it was unknown until recently. Tree of moderate size and nearly destitute of thorns, except when grown from seed, and then very thorny.

TANGERINE ORANGES.

A section of *C. nobilis* commonly called *Tangerine* is a more robust and sizeable tree, with larger foliage, and fruit of the same shape and size, but of a lobster-red color. This fruit is greatly admired, and more in request on account of its showy appearance, but in delicacy of flavor scarcely equals the yellow. A small variety of Tangerine, the **Spice** or **Cleopatra**, is of quite inferior quality, but an enormous bearer and very showy and ornamental. Used for garnishing tables.

Bergamot (*C. Bergamia*). Fruit pear-shaped, pale yellow, with green, sub-acid, firm, fragrant pulp; fruit and foliage distinct. Oil of bergamot is distilled from the rind.

C. Desimatus. An odd variety grown for ornament, with drooping leaves, no two alike.

King. (King of Siam.) A large variety of Tangerine, of more globular shape, introduced from Cochin China in 1882. Skin thick and uneven, dark red and loosely adhering; pulp mild and delicious. Tree thorny and robust, with large foliage. The habit of ripening late when other varieties of *C. nobilis* are out of season, together with other prime qualities, recommended it for general cultivation. California.

Kumquat (*C. Japonica*). A small shrub hardier than the orange, upon which or trifoliata it is usually worked. Fruit about an inch in diameter, with sweet rind and acid juice, wholesome and refreshing. Large quantities preserved in sugar are imported from China. There are two kinds, round and oval.

Myrtle-Leaved Orange (*C. myrtifolia*). A handsome dwarf tree, with small, dense, dark green, glossy leaves, bearing a small flattened fruit of little use. A beautiful shrub for ornamental grounds.

Philip's Bittersweet. Resembles the sour orange in leaf and fruit, and is found intermingled with it in the wild groves of Florida. Its juice is insipidly sweet, and the white inner rind extremely bitter and disagreeable, which spoils it for commercial purposes. Florida.

Satsuma is another section of *C. nobilis*, with tree and foliage more like the regular orange, but with fruit of a bright yellow, closely resembling the Mandarin. Nearly seedless. It ripens earlier and is quite hardy, particularly when budded on trifoliata. The flavor is less spicy and aromatic. It is in great request for planting in exposed situations, too cold for other oranges. Identical with Unshiu of Japan. Has not been a profitable commercial sort. Japan.

Tangerona. A recent importation from Brazil, evidently a hybrid of the Mandarin, judging from the pulp, which resembles Sat-

suma in mildness and delicacy. Fruit small, round or slightly flattened, with a roughened, bright yellow exterior. Leaves large, like those of the ordinary orange. It is of robust habit, a free bearer, and ripens very early.

In Florida the earliest varieties of oranges, such as Tangerona, Satsuma, Sweet Seville, and Early Oblong, are sweet enough for shipment by the end of September or early in October. About the middle or last of April, owing to the hot and dry weather, and the draught on the trees by the young crop, the fruit remaining becomes over-ripe, loses flavor, and dries up, or becomes too soft and flabby to handle. Valencia Late, Paper-Rind St. Michael, Majorca, and Garey's Mediterranean Sweet hold up several weeks longer, but Hart's Late or Tardiff keeps all the year round. This last is being more largely propagated in Florida than any other, and when the trees grow up again Florida oranges will be found in market at all seasons. In southern California oranges ripen later than in Florida, in northern California about the same time and in Arizona somewhat earlier.

THE LEMON.

The lemon (*Citrus limonum*) is supposed to have sprung from the citron and was introduced into Palestine and Egypt by the Arabs in the tenth century, and into Europe at the time of the Crusades. While not so extensively cultivated as the orange, it is far more useful, being indispensable in cookery, confectionery, perfumery, and medicine. The tree is faster growing and larger than the orange, and exhales from every part when bruised a delicious perfume. The flowers are of greater size and tinged with purple. It not only thrives on a poorer soil, but is more productive and patient under neglect, though less hardy against cold.

The rules for cultivating the orange apply generally to the lemon. To secure the finest and smoothest fruit it should not be allowed to run up to any considerable height, but rather shortened-in and pruned downward. A low, widely spreading tree, sheltered from winds, is best, as the most beautiful lemons grow in partial shade and near the ground. It is generally worked on sweet or sour orange stocks, preferably the latter, as making a tree more hardy and less liable to disease. As a seedling the rind is apt to be bitter, therefore varieties

having sweet rinds are selected for propagation. If allowed to hang till fully ripe, the fruit often grows to an enormous size; the peel becomes thick and spongy, and the acidulous properties diminish, rendering it unfit for market. To avoid this it is gathered green and partially grown, and stored in cool, dark apartments until the skin changes to a bright yellow. A lemon weighing three ounces is reckoned a convenient size. With proper care it will keep many months in prime condition. Its brief periods of rest and almost continuous stages of growth and bloom render the tree very sensitive to frost. In a state of quiescence it has endured almost as great a degree of cold as the orange. The ideal shape of a lemon is oblong, with a pointed protuberance at the blossom end. The rind should be as free as possible from bitterness, clean, smooth, glossy, and abounding in aromatic oil-cells; the pulp fine-grained, solid, with few seeds, and highly charged with strong acid juice.

Bonnie Brae. A California seedling of high reputation.

Eureka. Fruit medium, sweet, rind a good keeper, few seeds; tree prolific, not thorny. Very popular in the coast regions of California. Native of Los Angeles, Cal.

Genoa. Fruit medium, oval, sweet rind, nearly seedless; tree dwarf, thornless. One of the best.

VARIETIES.

Imperial Messina. Considered the finest among many desirable varieties, imported into Florida by the late General Sanford. Tree has a few thorns, but the fruit is unsurpassed.

Lisbon. Fruit medium, oblong, with a thin sweet rind, few-seeded; tree prolific but begins to bear late, vigorous and thorny. Popular in California. Portugal.

Sicily. Several imported sorts bearing this name are largely planted and profitable.

Villafranca. Fruit medium, oblong, thin rind, juicy, strongly acid, nearly seedless; tree thornless; withstands lower temperature than other imported varieties.

MARKETING THE ORANGE AND LEMON.

The same methods of gathering and packing apply to both, except that the lemon is taken off while green, while the orange, unless in case of the earliest shipments, is allowed to become fully ripe. The fruit should never be pulled, which

often ruptures the skin and causes decay, but clipped closely with a shears made for the purpose, and deposited carefully in sacks, or baskets lined with cloth. Rough handling is a fertile cause of loss, and bruises and abrasions must be strictly guarded against. After being removed to the packing-house, they are left in the boxes or spread out in bins to lie for several days, which causes the skins to dry and soften a little. This facilitates handling and allows defects to develop. It is then assorted into different grades, according to color and appearance, and the sizes separated by running through a sizing-machine. Dusty or smutty fruit is first cleaned by washing or scrubbing, and afterward dried.

It is finally wrapped in tissue-paper, and each size and grade packed separately in boxes divided by a partition in the middle, and holding two cubic feet, which have been adopted as a standard. It must be crowded in snugly, with the top layer a little above the edges of the box, so that when the cover is pressed down and nailed, there will be no shaking or moving about of the contents. Then the package is made secure by a wooden strap around the middle and each end. Iron straps have been tried, but dealers prefer the wooden. On the ends are stencilled the grade, number in box, address of consignee and shipper, and route by which to travel.

In large establishments washing, sizing, and wrapping have been done by steam or other power, but nothing to supersede hand-work in grading and packing has yet been devised. A box contains 96, 126, 150, 176, 200, 216, 226, and 252, according to size, and there is an established method of arranging every layer so as exactly to fill the boxes. The most popular sizes of oranges are 176 and 200, and of lemons 300 to 400. Larger or smaller fruit than these, or that which is rough or rusty, brings a lower price, and overgrown lemons are almost unsalable. Fruit of high color and an exterior without spot or blemish is marked "Fancy," and sells much above the rest.

Until within a few years imported lemons have sold higher than our own, not from any inherent superiority, but on account of being gathered at the right stage and put up in a neater manner. Lately domestic lemons of the best quality have been produced, and packed in a style fully equalling and even surpassing those imported, and at no distant day our

groves will render us independent of the foreign product. The unmerchutable fruit can be used in making citric acid, for which there is a large demand in the arts and medicine, or made into wine or vinegar. Although well-cared-for fruit often keeps months in good condition, the process of shriveling up or decay, though slow at first, really begins when the stem is severed; therefore it is best laid down in market as soon as possible. Various applications have been used, some of which were warranted to preserve oranges in a fresh condition for years, but so far none have given satisfaction. Fruit from cold-storage goes to pieces very soon after being taken out.

THE CITRON.

The citron (*Citrus medica cedra*) is usually grown as a shrub or small tree; the flowers are large and externally of a violet color; the branches, weighed down by the enormous fruit, are continually rooting at the ends and spreading, causing a neglected bush to expand in time into a dense thicket. It is very tender and best grown from layers or cuttings, which quickly spring up again if killed down by frost. It is supposed to be the parent of the lemon, and between the two occur an endless variety of intermediate forms or hybrids. Chiefly valued for the thick and tender rind, which, after having first lain in strong brine, is freshened and stewed in syrup till saturated, and then, after being candied and dried, is familiar to every one as the citron of commerce. A fragrant oil, used by perfumers, is also distilled from the rind. For preserving it must be used in a green state.

VARIETIES.

Fingered Citron. A rare and primitive form; fruit of enormous size, with lobes separating and projecting like fingers. Grown sparingly in China, where it is highly esteemed for its delightful odor. Placed upon porcelain dishes and brought into their temples and apartments, it fills the air with a fragrance so penetrating as to be perceptible at the distance of a mile. Has been brought into California from Japan, but is little known as yet here.

Lemon. So-called from resembling a lemon in shape and color;

skin pale yellow, glossy, and wavy. Fruit sometimes weighs as much as ten pounds.

Lyman. A lemon-citron of moderate size, with a sweet and edible rind, also excellent for preserving.

Orange. Resembles the above, except that the skin is more wavy, and like the orange in color.

THE SHADDOCK.

The Shaddock, or Pomelo (*C. decumana*), named after Captain Shaddock, who first brought it to the West Indies, is supposed to be indigenous to the Malayan Islands. It is one of the handsomest of the genus; of moderate height and spreading form; rather more tender than the orange; attractive by reason of the magnificent size of its fruit, which sometimes attains a diameter of nine inches and a weight of fifteen pounds. The flowers are very large, white, and fragrant; the leaves large, with broadly winged leaf-stalks; the skin is pale yellow, the rind thick, white, spongy and bitter; the pulp greenish, sub-acid, watery, and aromatic. No section of the citrus exhibits a greater diversity than this. There are oblate, globose, oval, pyriform, and flattened forms, both thick and thin-skinned, enclosing white, pink, red, or greenish pulp, which varies from sour, bitter, and acrid to a most delightful blending of all in harmonious proportions.

In the West Indies it is a favorite addition to the dessert, after being prepared by removing the bitter membranes and sprinkling the pulp with sugar. In this country a small variety, somewhat larger than an overgrown orange, is becoming a favorite and beginning to be extensively grown for market. This is the "Forbidden Fruit," called grapefruit, from a habit of growing in clusters like bunches of grapes, or pomelo, leaving the name shaddock for the large sort, although, strictly speaking, all are pomeloes. This is rather thin-skinned for its size, and filled with a refreshing, sub-acid juice. There is a pronounced bitter principle in the inner rind and integuments, which, if not too strong, one acquires a liking for in time. The firm, tough skin renders it a good shipper, and preserves the juices for a long time, often till far into the summer. In very warm and oppressive weather, nothing can be more salutary or re-

freshing, and the demand for it is constantly increasing. It is wonderfully productive. Sixteen barrels of fruit have been gathered from a tree twenty-five years old.

Until quite lately but little attention was paid to the grape-fruit, specimen trees of which were found here and there, mostly seedlings not greatly varying from each other, except where accidental crossing with the orange had developed some distinctive qualities. Perhaps the best is Mays' Pomelo.

VARIETIES.

Aurantium, Royal, Leonardy, and Triumph are much like Mays

Marsh. Recommended as having few seeds, which, in a fruit so full of seeds, is an obvious advantage.

Mays. Was growing as an old tree, at the home of Dr. Mays, Orange Mills, Florida, at the close of the civil war. Has always taken premiums over others wherever exhibited. Shows slight admixture of orange. Flavor unusually sweet and delicious, with but little of the bitter principle.

THE LIME.

The Lime (*C. acida*) is generally considered to be remotely allied to the citron, but may be, as we know it, a modified and improved form of the wild lime (*C. hystrix*) of India or the Malay Islands. Though classed as a shrub, in a favorable climate and with room to expand it forms a small tree. Being the most tender of the family and nearly always in a growing state, it is easily killed down by frost, but never fails to spring up again vigorously. It is very thorny, and when closely planted forms an admirable and impenetrable hedge, always full of fruit and so robust as to need little care. The flowers are small and entirely white; color of fruit pale yellow, resembling a lemon. The skin is thin; pulp light green and filled to bursting with a very sharp acid juice, better for most purposes than that of a lemon and used in preference by people in the tropics. The peel, however, lacks the mild fragrance of the lemon, which, together with the better keeping qualities of the latter, accounts for its greater estimation in countries where these fruits do not grow. Still, when carefully handled, with our present rapid transportation, is bears

carriage and goes through well, and there is no reason why, when better known, it should not become more popular in northern markets. Its early and wonderfully abundant bearing, sturdy indifference to neglect, and freedom from disease make it easier grown than any other citrus. It flourishes admirably in Southern Florida.

Propagation.—The most common mode of propagation is from seed, which, to prevent deterioration, should be taken from the best fruit. It nearly always comes true to kind and bears in three or four years. In cooler latitudes, near its northern limit, it is budded at the surface of the ground, on any hardy orange-stock which will retard the too active flow of sap in winter, and make it more resistant. The trees can be planted much closer than the orange.

The most common is a small variety, resembling a miniature lemon, called the Mexican, Florida, or West Indian lime. Skin very thin and smooth; juice abundant, highly aromatic, rich, acid, and pleasant. The Persian and Tahiti are vigorous growers and not very thorny. Fruit excellent and nearly as large as a lemon. Tree spreading, with coarser foliage.

VARIETIES.

French. (False Lemon.) Grown for many years in Florida and the West Indies. This is more correctly a lime. Skin thick, very warty and uneven, and loosely adhering. Shape resembling a King orange, but smaller, with a protuberance at the blossom end. Color deep yellow. Pulp agreeably acid, and segments divide as easily as those of *Citrus nobilis*. The Minorcan residents of Florida esteem it above all others for making punch, but it has no commercial value. It is of very vigorous growth and in great demand as a stock upon which to bud varieties of oranges and lemons. On this stock the Navel orange, usually a poor bearer, produces abundant crops.

Imperial. Very large, oval, of good quality. Reported as unusually hardy.

Kurna, Galgal, Turanj, and other East Indian limes have a very thin spongy rind, with little pulp, and may be considered citrons rather than limes.

A variety imported into Florida from South Africa, by Colonel Church, of Orlando, and called "Forbidden Fruit," is really a lime of enormous size, resembling a citron in appearance, but thin-skinned and full of strongly acid juice.

Mexican. Medium large, oval, light yellow, good. The common variety in California.

Rangpur. (Mandarin Lime.) Closely resembles a Mandarin orange in appearance, with a strong acid juice of distinct flavor. India.

CHAPTER XXXVII.

THE BANANA.

THE banana (*Musa Sapientum*), though a strictly tropical plant, is often seen in gardens from Charleston south and along the lower portions of the Gulf States, where it is used chiefly for ornament, but after mild winters fruit is freely produced. It is one of the most beautiful and graceful of all members of the vegetable kingdom; one species, *M. Ensete*, the great Abyssinian banana, was pronounced by Charles Kingsley the most beautiful of any he had ever beheld.

In the middle and even northern portions of Florida it was grown in a small way for its fruit, until the large importations by steamers from the West Indies and Central America, at low prices, rendered its production there unprofitable. In the extreme southern portions of the peninsula, however, where there is little frost, it can still be raised to advantage.

The large yellow bananas (Jamaica or Martinique) and the red, or Baracoa, are the best and most profitable for market. These varieties require too long a season for any place outside of the tropics. In middle Florida an inferior sort called Orinoco, and a very delicate, high-flavored variety, Hart, are the best to cultivate, as they ripen sooner and are the most hardy. Farther south the dwarf Jamaica (*M. Cavendishii*), is preferred as being least liable to be prostrated by high winds, and, though short and stout, produces very large bunches. The only practicable mode of protection in winter against frost is by banking with earth or sods around the stem two or three feet high. Then, if the exposed portion above should be killed, it is cut off in spring when the earth is drawn away, and the stump remaining will grow up and blossom in time to perfect fruit before the following winter. Propagation is effected by suckers or offsets, planted eight or ten feet apart in strong rich soil. Each stalk produces but one cluster,

after which it dies and is replaced by the numerous sprouts from the base. To obtain the largest bunches these offsets should be chopped out as they appear, and only three or four stalks of different ages, so as to keep up a succession, allowed to remain in one place. Ashes or strong stable manure are good fertilizers. In the tropics, bunches of 200 fruit and upward are common, but near the northern limit from 75 to 125 are all that can be expected. From long cultivation and propagation by offsets, seed has almost entirely disappeared from the fruit. Sometimes, but rarely, a few are found, and from these new varieties may be obtained. There are several ornamental sorts which produce seeds and do not sucker.

Bananas are generally ripened in the house, the bunch being cut when its stem curves over to the stem after the fruit is fully developed, though still green. It should then be hung in a dark place to color and ripen. There is no difficulty in raising and fruiting it in hothouses.

CHAPTER XXXVIII.

THE DATE.

THE Date Palm (*Phoenix dactylifera*) is one of the most striking and beautiful of trees, and especially attractive by its novelty to persons coming from the temperate zones, where no palms exist out of doors. It has not as yet been cultivated to any extent in this country; indeed there are but few places where it is likely to prove a success as regards fruit production. For this a location is necessary where there is no approach to frost in winter, or where the mercury does not fall below twenty degrees for any considerable length of time, and a hot rainless summer, with facilities for irrigation.

The Arabs say that the date should have its head in the fire and its roots in the water. Such conditions exist in some districts of Arizona and California. In the lower Atlantic and Gulf States, and in the West India Islands, thrifty specimens may occasionally be seen, but their fruit is much inferior to that from the Orient, either by reason of the scalding showers during the growing and ripening season, or neglect of proper fertilization of the bloom, for, the tree being diœcious, unless pollen from the staminate blossom is applied to the pistillate blooms at the right time the fruit will not be properly developed, and the seed will be imperfect or entirely lacking. In date-producing countries, propagation is chiefly effected by suckers or offsets from the base of the parent tree, which are removed when large enough to form roots and planted where they are to grow. Copious and continued watering is necessary until new roots form. Seeds germinate readily, but produce many more staminate trees than are wanted—one of these to twenty of the opposite sex being sufficient—and until flowering begins there is no means of determining the sex. Of course, suckers are always the same as their parent.

**FIG. 814.**—Date Palms.

In 1890 a large number of offsets from several of the best varieties were imported by the Department of Agriculture from Algeria and Cairo and distributed throughout New Mexico, Arizona, and California. When these come to maturity the question of adaptation will be more definitely settled. In the date-producing countries of the East trees often begin to bear at six or eight years of age, but specimens in the Southern States frequently have not flowered until after fifteen or twenty years. Like other palms, all of which are greatly retarded by mutilation of their roots in transplanting, it is best to remove the seedlings either while very young, so that the roots may be preserved intact, or to defer the operation until the tree has acquired considerable size, when the roots may be cut closely, and the top shortened-in to a single leaf. If freely watered, new roots will start at once. A better way still is to plant several seeds where the tree is to grow, removing all but the best one a few months after they have germinated. Seeds of the imported dates sprout in five or six weeks after being placed in the ground.

CHAPTER XXXIX.

THE FIG.

THE genus *Ficus* consists of about six hundred species. Most of them, being natives of tropical regions, are tender, but their easy propagation, robust growth, indifference to rough treatment, and the beauty of their large, glossy, dark-green leaves, sometimes handsomely variegated, combine to render them general favorites. In their native forests many grow to an immense size.

The one that concerns us here is the *Ficus carica*, which produces the well-known fig of commerce.

While its original habitat is supposed to be the country around the Persian Gulf, it is perfectly at home in all warm temperate regions, particularly those bordering on the Mediterranean, where it grows spontaneously. Besides being the hardiest of the family, it is at the same time the most useful, as well as one of the longest-lived, continuing in health and productiveness for several hundred years.

Unless accustomed to them from childhood, one does not always relish fresh figs at first, but, as with many other tropical fruits, a liking for them once acquired becomes very strong. As an article of food they are exceeding nutritive, and by reason of their mucilaginous character few fruits are so mild and salutary or so free from irritating tendencies. Being slightly laxative, there is no danger of evil consequences from eating to repletion.

Although the fig flourishes everywhere in the warmer parts of the United States, its cultivation is still much neglected. This seems strange when we consider the excellence of the fruit and the hardy constitution of the tree, which always grows up after being frozen down, and sometimes bears a little fruit the season following. Old and well-ripened wood withstands hard freezing, but the tender ends of growing shoots

are easily nipped. When in free growth, with the sap moving, a few degrees of frost may be fatal, and, as the tree is a rank grower and starts early in the spring, this habit renders it peculiarly susceptible to damage from late frosts. Even as far north as New York the roots often survive the loss of the top, and if trained low, so that the branches may be layered and deeply buried in the fall, and uncovered the following spring, it may be wintered in fair condition if one cares to take the trouble. But in order that this operation be successful, it is essential that the young wood be well ripened, and late growths be prevented as far as possible by planting on dry, well-drained, sandy or gravelly soil, in a cool exposure, and giving no fertilizers or cultivation late in the season. If the fig is grown at all, however, out of its own proper latitude by these precautions, it is more as a curiosity than for profit, because where it is a rarity few have acquired a taste for the fresh fruit, which, as before remarked, needs the high heat of a southern climate to develop the rich and melting honeyed sweetness in perfection. Even in the far South, figs that mature in September, when the weather becomes cooler, are almost insipid compared with those of midsummer.

Probably the chief reason for the little attention paid to the fig in this country lies in its extreme fragility, it being one of the most perishable and delicate of fruits, and one of the most difficult of carriage to any but the nearest markets. Rapid transportation in refrigerating cars ought now to do away with this objection, and there is no reason why figs should not be conveyed long distances like the equally perishable strawberry, nor why, when they become plentiful in any market, and people have learned to like them, a large demand should not spring up for this, one of the most delicious and wholesome of all fruits.

In the Gulf and cotton States one sees a few fig-trees around almost every country house, but attempts at field culture are rare. About 1883, Mr. J. K. Russell, of Olustee, Fla., set out an orchard of thirty acres, which he destroyed after the trees came into bearing, having become satisfied that, on account of the high price of labor in this country, he could not compete with the cheaply produced dried figs imported from the Mediterranean. Much about the same time Mr. S. B.

Valls, of St. Augustine, went into the business of preserving them, using during the season some sixty bushels per day, but, as he finally gave it up, we may infer that the profits were too uncertain to warrant the continuance of the enterprise.

In the Southern Atlantic and Gulf States one great difficulty lies in the time of ripening, which comes at the opening of the rainy season. Should the rains be moderate or slightly delayed, all is well; if not, the figs, surcharged with watery juice, burst open and decay just before maturity. In the warm interior valleys of California and Arizona the conditions are much more favorable, on account of little or no rain falling during the ripening period.

The fig is not at all particular about soils. It will grow in the driest situations, but unless there is moisture enough to support and preserve the foliage the fruit will not mature. Even in the hottest valleys, so long as its roots can draw up water, scorching winds that roast all other fruits only serve to help along the fig. It is a voracious feeder, and the long rope-like roots travel surprising distances in search of nutriment. Trees on the sites of old buildings, amid decaying mortar and the accumulated fertility of years, have borne enormous crops for many successive seasons. The soil should be moderately well drained, but excellent results have been noted even where water came near to the surface, so long as it did not overflow and remain upon the ground. Moist and rich lands promote a late and heavy growth of unripened wood easily killed by frost, and such places should be avoided where extreme cold weather is likely to occur. Many tender varieties from the warm regions about the Mediterranean cannot be expected to do well in our country, except in a few favored sections subject to similar conditions, where the nights as well as the days are warm, as a rule, and where there is a sufficiency of moisture in the soil.

PROPAGATION.

Seeds.—Propagation may be effected from seeds, cuttings, layers, and suckers. Seedlings are only resorted to when new varieties are desired, and as their tendency is to revert to a wild state, and the figs raised in this country seldom contain

fertile seeds, this method of propagation is rarely used. If the seeds of imported figs are separated by washing, and those that sink in water planted under glass in fine loam, most of them will soon germinate, and may be set out in nursery the following year. They should bear in three years, but several years more are required fully to establish their qualities.

Cuttings.—The usual method of obtaining plants is by *cuttings*, generally six to eight inches long; those with a heel, or layers beginning to form roots, are the quickest. Cuttings may be made of the young, well-ripened wood any time before the buds start in spring, and if tied in bundles and inverted until the butts are calloused there will be fewer failures. If wood be scarce, single-eye cuttings may be rooted with proper care. Trees get on more rapidly if planted as cuttings where they are to grow. When transplanted they will often remain dormant, sometimes for several years, until the old roots are replaced by new ones. Better cut the old roots off quite close and head back the stock to a foot or two above the ground, which will cause it to grow sooner. If a deep and wide hole is excavated where the tree is to stand, and filled in with rich earth mixed with good compost, the growth will be greatly accelerated. This filling should be allowed to settle, and the cutting planted in a slanting direction in the centre with clean, fine sand tightly packed about its base, then mulched and supplied with water if the weather is dry. When carefully done there will be few failures, and some of these cuttings may produce several figs in the following fall, and begin to bear freely in two or three years.

Grafting and Budding.—Where trees are barren or shed their fruit, they may be grafted or budded. This is not generally recommended, for the reason that trees which have been worked over sucker freely and constantly. In grafting, all excised parts must be coated with hot wax thoroughly to exclude the air. Common shield budding is successful, if the edges of the thick bark are pared down a little, and narrow strips of waxed cloth wound around tightly and closely. Annular budding, as practised on the pecan or hickory, is preferred by some. This is done during the fall in sprouts about the size of one's finger, which are made to grow by cutting off the limbs to be worked and rubbing away all subsequent

sprouts except those reserved for budding. The ring of bark containing the bud should be from one to two inches long, closely fitted and snugly tied. After a few weeks the part above is cut off. If done in spring, when the sap is up, the part above had better be removed at once to prevent souring and decay from descending sap before the union takes place.

CULTIVATION.

Orchard Planting.—As the fig-tree grows in our Southern States, fifteen or twenty feet apart is a good distance for orchard planting, but where it reaches the size some varieties do on the Pacific coast, forty feet or more would not be too close. The more robust varieties need more room than moderate growers. While young, peach-trees, vines, or anything of a temporary character may be grown between, to be removed when the figs require more room. It is best to favor low branching, which protects the trunks from sunburn until shaded by the tops. Low-headed trees are also less likely to be injured by high winds.

Pruning.—The fig needs little pruning beyond the removal of dead or decaying limbs, and those that interfere with each other. While young, clean cultivation is desirable, which must be shallow, since the roots run near the surface. As the trees become older and cover the ground, less is required; often none is given besides cutting down bushes and weeds that may spring up. A coating of loose litter or mulch, scattered about under-foot, protects the fruit from bruising as it falls, and keeps it clean from sand and dirt. Fertilizers may be applied broadcast and lightly worked in or allowed to dissolve by the rains. The fig is singularly exempt from disease and attacks of insects. Sometimes a few scale are found, which can be destroyed by the usual insecticides. In some sections wood-borers have been troublesome.

Caprification.—In this operation the fruit of the wild or Capri fig is hung about among the limbs of the cultivated varieties, and sometimes a branch of the latter is grafted with a scion of the other, so that a few of the wild figs may be grown among the improved ones, with the object of securing a better fertilization from the pollen of the staminate flowers, which

are abundant in the wild variety. In Europe this is effected by an insect called blastophaga, which travels about over the trees. Repeated attempts have been made to naturalize this insect here, and recently with success, into the fig plantations of California. Mr. Roeding and Mr. Eisen, of California, and others, have recently experimented successfully with Caprification. Similar experiments were made by J. L. Normand, of Louisiana, with excellent results. Perhaps when we understand better how to secure perfect fertilization of the young fruit, its untimely falling off, which renders so many fine sorts worthless, may be prevented.

Drying.—In drying, the figs are carefully gathered in slatted trays and dried like raisins, being turned occasionally and covered at night. If not sufficiently dried they will ferment and spoil, and if over-dried their fine flavor will be permanently injured. They are then dipped for a moment in boiling brine, to be worked over afterward with the fingers and pressed tightly into boxes. The dipping into salt water seems to be essential, and during the manipulations the fingers must be occasionally moistened to keep them from adhering. A little of the salt is absorbed by the fruit, improving its flavor and preserving it from the attacks of insects.

In the old fig-producing countries, the varieties are very numerous, but here only a few are generally cultivated, being, as it were, a survival of the fittest. In the Southern States we find the following list in common use as the most hardy and productive:

VARIETIES.

Adriatic. Medium, roundish; skin very thin, green and yellow; pulp red or white, with violet streaks in the meat, varying with location. Good.

Angelique. Medium, pyriform, yellowish-white; pulp white with rose-colored centre. Quality very poor to good.

Athens.* (Marseillaise.) Small, roundish or turbinate, indistinctly ribbed; skin whitish-yellow; pulp red, very sweet. One of the best drying figs in France and California.

Black Ischia. Small, roundish obovate; skin smooth, dark violet black, greenish around apex; pulp red, sweet, and rich. Excellent, but small size.

Brunswick. Very large, pyriform, ribs distinct; skin pale amber

with a violet tint; pulp amber. Early and large, but of poor flavor. Common.

Celestial.* (Celeste.) Small, ovate, turbinate; skin dark violet amber, thin; pulp deep rose; sweet, good. Very hardy.

Dottato. Medium, ovate, pyriform; skin yellowish-green; meat white; pulp yellowish-amber, or with a tinge of violet. One of the best for drying.

Du Roi.* Above medium, round, pyriform; skin pale bluish-green; pulp amber, with rosy streaks; related to Athens. One of best for drying.

Genoa. Above medium, pyriform; skin downy, pale olive green; pulp pale rose.

Marseillaise.* Medium, ovate-pyriform, ribs numerous and distinct; skin pale yellowish-green, mottled with white; pulp amber, sweet, good. A standard drying fig.

Mission.* Medium to large, turbinate, ribs distinct; skin rough mahogany violet, with a red flush; pulp red, sweet but not rich. The oldest fig in the country and profitable on account of its great productiveness.

Monaco Bianco. Large, rounded, turbinate, flattened; skin dark bluish-green; pulp dark rose, very good. An excellent table fig.

San Pedro, Black. Very large, elongated ovate, with no stalk; skin smooth, violet black, with green neck; pulp red, tinted violet, excellent. The largest fig known, good for table use.

San Pedro, White. Large upright grower; fruit very large, roundish or flattened; skin greenish or bright yellow, very tender; pulp light clear amber, sometimes slightly tinted with red. Sweet and good when fresh, but not adapted to drying. In the Southern States casts its fruit badly.

Smyrna.* This well-known fig of commerce has recently been introduced into California, and it seems probable that a very important industry will be established upon it.

Turkey.* Large turbinate, pyriform, stem short; skin brownish or purplish-red, with darker ribs; pulp dark red, sweet, very good. One of the best. Confused with Brunswick.

There are some other excellent varieties cultivated, whose nomenclature is still unsettled. As much attention has lately been directed to fig-culture in this hemisphere, a few years' further experience will greatly add to our knowledge of the different sorts and the various idiosyncrasies of the family.

CHAPTER XL.

THE GUAVA.

THE Guava (*Psidium guayaba*) may be called the apple of the tropics. From its original home in tropical America, it has become dispersed over all equatorial regions. As the tops, which succumb to several degrees of frost, are promptly renewed from the roots and bear in a few months, it is often grown in a small way in subtropical climates. As soon as the repugnance to its penetrating and rather unpleasant odor has been overcome, it is accounted one of the most fascinating of fruits, either fresh or made into jelly, marmalade, puddings, and pies.

In productiveness it exceeds almost any known fruit-tree. In subtropical regions the regular crop ripens gradually from August to October, but there are a few scattering specimens to be found maturing at all seasons. If the whole ripened at once the branches would bend to the ground with their load, of which there is a perennial renewal and no barren years. In the tropics it is often a pest, springing up everywhere from seeds dropped by the birds, and overrunning abandoned plantations till they become transformed into impenetrable jungles. In Southern Florida it is an inmate of every garden, and some of the large white-fleshed kinds brought from the East Indies are among the most delicious and fascinating fruits in cultivation.

The leaf, resembling that of a cherry, is rounded at the end and of a wine-color while young. Flowers white, axillary, fragrant, and produced in great abundance.

The fruit is round or pyriform, with a white or yellow skin, and a most refreshing sub-acid pulp, of the same color or sometimes crimson, containing many small seeds. It ranges from the size of a cherry to that of a large pear or apple.

Two kinds, *P. Cattleianum* and *P. lucidum*, are very dis-

tinct, with thick, shining, dark-green leaves like the camellia, but smaller. These are subtropical and almost as hardy as the orange. The first, sometimes called Strawberry guava, bears a dark crimson fruit, from an inch to an inch and a half in diameter, while that of the latter is lemon or cream-color. If the fruit were not produced in such enormous quantities it would be larger, as it always is whenever there is a light crop, which rarely happens.

PROPAGATION.

It is easily grown from seed, cuttings, or layers, and, where there is a little frost, may be safely carried through the winter by bending down and covering the branches with straw and earth.

CHAPTER XLI.

THE LOQUAT.

THE Loquat (*Eriobotrya* or *Photinia Japonica*), sometimes called Japan plum, a small evergreen tree, with long and broad, serrated, dark green, roughened, and wavy leaves, is one of the most desirable both for ornament and fruit. The blossoms, freely produced in terminal panicles, are white and deliciously fragrant.

They begin opening in August, and from that time until December the air is laden with their rich perfume. The fruit, of a creamy yellow, resembling in shape a small apple, round or pyriform, and growing in compact bunches like grapes, ranges from an inch to an inch and a half in diameter, and contains several large



FIG. 816.—Loquat.

seeds surrounded with a most piquant, juicy, and refreshing sub-acid pulp. Ripening from February till May, when other small fruits are scarce, and bearing transportation well, it ought to be plentiful in our Northern markets, where it is as yet scarcely ever seen. In Louisiana and other Gulf States it forms a good substitute for the cherry, which does not bear well in that latitude, and which it somewhat resembles in flavor, but to which it is superior for jellies, pies, and preserving, having all the richness of the cranberry without its asperity.

While generally hardy as far north as Charleston or farther, where it is a favorite for ornamental purposes, it cannot be depended upon to bear fruit except in the middle of the orange-growing districts, on account of the habit of ripening in winter.

PROPAGATION

is generally effected by seeds, but cuttings are easily rooted. The best method is to bud or graft upon seedling stocks scions taken from trees producing the largest and best-flavored fruit. As it belongs to the *Rosaceæ*, stocks appertaining to that genus, or any of the closely allied *Pomaceæ*, may be used.

Soils.—Although growing well almost anywhere, some soils are unfavorable for the production of its fruit. Perhaps the best is a moist and well-drained sandy loam with clay foundation. In such a situation, trees at the age of ten years have borne over a barrel of fruit. Full crops every year are the rule. For culinary purposes the fruit need not be quite ripe, but for eating fresh it is unpleasantly acid unless fully matured. Some are much more acid than others. No attention has been paid to varieties beyond the importation from Japan of an improved sort called the Giant, which is said to have fewer seeds, but otherwise is no better than our selected seedlings. It improves very fast by selection, from due attention to which great possibilities are probable.

The same distance apart in orchard as for the peach will answer for the loquat, which does not appear to live to a great age, and forms a dense and compact head of a rounded and symmetrical shape.

Beyond a few specimens, the loquat has only come into prominence in this country during the past twenty-five years. From being indigenous to Japan and China it is often called Japan plum, although not a plum at all.

VARIETIES.

Advance. Fruit yellow, pear-shaped, very sweet; clusters large.

Victor. Largest, pink to red, desirable for canning.

CHAPTER XLII.

THE PERSIMMON.

THE Persimmon, or Date Plum, belongs to the genus *Diospyros*, which includes about one hundred and fifty species of trees, natives of tropical or temperate regions, many of low growth, and others rising to a lofty height. The fruits are round or pointed berries, varying from the size of a cherry to a large apple, and, though disagreeably astringent while green, by reason of the excellence of some when fully ripe have won from botanists the generic name, which literally means "food of the gods."

VARIETIES.

- D. Mabola.** A garden favorite in the Isle of France; fruit as large as a quince and of delicious flavor.
- D. Texana.** The persimmon of Texas and Mexico. A low tree, bearing a large round luscious berry of a dark color.
- D. Virginiana.** (American Date Plum.) The common persimmon of the United States, sometimes called American Ebony. A tree of moderate size, occasionally rising to sixty feet or more in thick forests; very abundant throughout the Southern and Western States, especially those bordering on the Gulf of Mexico, and occurring more sparingly as we approach the latitude of New York, its northern limit. Wood close-grained and hard, dark yellow or almost black. Trees often dioecious, with ovate oblong leaves and pale yellow flowers. Fruit reddish-yellow, resembling a plum, containing eight or ten flattened oval seeds; sweet, melting, and delicious when ripe, but horribly astringent previous to maturity.

In the latitude of Virginia it does not ripen before frost, hence the belief that the action of frost is necessary to its amelioration, but farther south the long warm summers accomplish the same result, bringing it to the highest degree of perfection before cool weather. So far nothing has been done in the United States to improve this fruit, except the oc-

casional selection of a wild tree whose product was of better quality than usual.

[The illustration (Fig. 817) shows the usual appearance of the wild persimmon, and Fig. 818 of one which has been care-

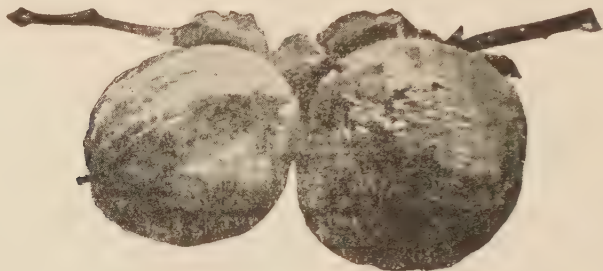


FIG. 817 — Virginia Persimmon.

fully cultivated. The American persimmon is entirely hardy at least fifty miles north of New York City, and will bear full crops annually. While in the Southern States it is said to be easy to transplant, it is farther north quite different. It is not an easy tree to transplant, its long tap-root being intolerant of molestation; saplings two to three feet high may be moved, however, with fair prospect of success.



FIG. 818 — Effect of Cultivation on Persimmon.

The hole in which they are to be placed should be dug out fully three feet deep, and the original earth replaced with good surface soil. Do not give them up if they do not put out a leaf the first season. I have had them start and grow well the second summer. The tree is dioecious, and unless one has a number of them, the only sure way to get fruit is to insert a graft from a male tree on

a female, which will in a year or two furnish sufficient pollen to fertilize the entire tree. It bears at six to eight years from seed. (Grafting on the persimmon is usually done in winter, as in apples, by collar-grafting.) As there is

no way of distinguishing a male from a female tree, until they have blossomed, and nurserymen are therefore unable to tell what they are selling, it is rather a drawback to the cultivation of the fruit beyond its native habitat.—ED.]

By fermentation an excellent beer and by distillation an inferior spirit is made from the persimmon. The fruit is also greedily devoured by birds and by the opossums, insomuch that an abundant crop is interpreted by the country people as a sign of fat 'possums and a hard winter.

The Japanese have worked upon their own native *diospyros* till it has become the most highly esteemed of all the fruits of the island empire, and the original little berries have not only improved in flavor but increased in size till some exceed a pound in weight. Planted everywhere, it is now a conspicuous feature of their landscape, and, aside from its value as food, travellers unanimously agree in extolling the beauty of the broad, glossy leaves, and the brilliant crimson and golden tints of the fruit clinging to the branches after the foliage has fallen. This species, *D. Kaki*, although brought into Europe from China over a century ago, has only within a few years been known here. In the spring of 1863 the first seeds were received and planted in the garden of the Department of Agriculture at Washington. These grew off well, but were killed by frost in winter. The experiment was repeated with the same results, proving the climate of that latitude to be too severe for the varieties then introduced. About ten years later, some grafted trees of the best varieties were imported and distributed throughout the Southern States. A more extended experience proved them to be about as hardy as *Magnolia grandiflora*. Some are more tender than others, but all are perfectly safe where the mercury does not fall below ten degrees for any considerable length of time. In the coast region from Norfolk southward, and all through the cotton-belt, they seem to be perfectly at home and vie in vigor and productiveness with the native species. From parts of New Jersey we hear reports of their survival during mild winters and of satisfactory fruitage, and it is possible that when varieties from the more northerly and colder parts of Japan have been tried here, some may be found even more resistant than any we now have. Much about the same time

large importations were made by Rev. Henry Loomis, of San Francisco, and sent all over the country. His circulars, with descriptions and brilliantly colored full-size illustrations of several varieties, astonished and fascinated fruit-growers, inciting them to try this, the most interesting pomological novelty ever brought forward. Many of these imported trees began to bear in two or three years, and, encouraged by the beauty, size, and excellence of the fruit, a large demand for the trees sprang up wherever the winter climate was found sufficiently mild.

As a general rule, the imported trees proved short-lived and unsatisfactory. They were for the most part deficient in roots, and did not take kindly to our soil like the native persimmon, which, after being tried as a stock with complete success, showed a better adaptation even than seedlings of the *kaki* grown here. To insure good crops it is necessary to bud or graft from the best and most prolific varieties. Seedlings, usually having few perfect flowers and sometimes none, are unproductive and inferior.

Bearing begins early—often at two years—and the fruit sets so freely that, unless judiciously thinned, the trees become dwarfed by the tax on their energies. Trees from seed planted in the fall may be budded the following summer, and by another year will often reach a height of six feet and be ready for planting in orchard. Ten to fifteen feet each way is recommended as a suitable distance apart. After getting into regular bearing there is but a slow and gradual increase of wood, the strength being absorbed in the production of fruit. Some heavy-bearing sorts remain permanently dwarfed, but there are instances of isolated trees reaching a height of twenty-five or thirty feet, with a corresponding spread of branches, and a yearly record of thousands of fruit. The roots extend to a great distance, like those of the fig, but generally strike deeply enough to cause little interference when among other trees. Much of the nourishment seems to be drawn up from the subsoil. Native stocks in low-lying pine barrens, where the land is sour, filled with roots of the most persistent wild grasses and shrubs, and never cultivated, have, when topped and grafted with choice varieties of *kaki*, made fine heads and produced a profusion of beautiful, high-colored

waxy fruit every year. From this it might be inferred that but a minimum of culture is really needed. Still, knowing that something cannot come of nothing, it is evident that the continued removal of large quantities of fruit from the ground must finally end in exhaustion and barrenness, and that a recuperative system of fertilizing must be adopted. Perhaps the best soil is a well-drained clay or sandy or gravelly loam, but the trees appear to succeed on any soil not too wet, particularly where the native persimmon flourishes.

There are but few diseases or enemies. The most troublesome is the twig-girdler (*Oncideres cingulata*) (Fig. 819), which can be checked by gathering and burning the girdled branches as they fall, thus destroying the eggs of the insects which have been deposited in them. In some places the damage caused by this beetle has been so great as almost to discourage planters. There are several species of borers that work in the wood, sometimes killing the tree to the roots, which however always sprouts up again and may be re-grafted. Kerosene applications will destroy them. They often come from hickory-trees, and the trouble may be lessened by the removal of the latter. If the red spider or other allied mites attack the foliage, causing it to curl, or soft-shell scales appear, they may be easily disposed of by applying the common insecticides.



FIG. 819.—Twig-girdler.

The earliest varieties of the persimmon begin to ripen in August or September, and mature gradually, so that, in order to gather the fruit at the right stage, a tree must be gone over several times. For shipping, persimmons should be picked two or three weeks before softening, or they will not reach market in sound condition. Some experience is required to know just when they should be taken off. When fully ripe the color varies from bright crimson to yellow, and the outlines from flat or tomato-shaped to forms elongated like an acorn. Those having clear orange-colored pulp are more or less astringent at first, and unpleasant for eating till they become soft. The round or flattened forms, with dark flesh,

being sweeter and less astringent, can be eaten sooner, or just before softening. As with all new fruits, however good, the public is slow in acquiring a taste for them. At first they were eagerly bought by dealers for purposes of display, but as they became more common a liking for them sprang up and the demand is yearly increasing. A light frost improves the flavor, but at the expense of keeping qualities. If the late fruit is gathered before frost and stored in the house, much of it will remain sound for several months.

The texture of the fruit is soft and mealy; some are very sweet and juicy, without any decided acid. Their mild, wholesome, and nutritious properties recommend them to the most delicate persons.

Among the many varieties cultivated in China and Japan some are eaten fresh, and others made into a sweetmeat or dried like figs, to which they are much superior.

All fruit-loving birds are extravagantly fond of persimmons. Jays, mocking-birds, sapsuckers, and blackbirds destroy much of the ripening crop. If one does not care to kill them, which appears to be the only way of escaping their depredations, nothing remains but to plant enough for both ourselves and the birds.

Owing to carelessness of the Oriental nurserymen, the nomenclature of the Japan persimmon was at first badly confused. Sometimes half a dozen lots, differently labelled, would turn out to be all alike. Efforts have been made, with much care and study, to classify and name some of the best varieties, such as are now offered by our own growers. The following list includes the most valuable, and may be relied upon as correct. The varieties are arranged in the order of ripening, beginning with the earliest:

VARIETIES OF JAPANESE PERSIMMONS.

(The illustrations are reduced one-half in diameter.)

Zengi. One of the earliest, beginning to ripen in August or September according to latitude, and continuing in season two months. Round or oblate in shape, with a diameter of two inches and depth of one and three-fourths. Flesh very dark brown, solid, sweet, and containing many seeds. Tree prolific and vigorous. Fig. 820.

Faber's 129. Round, slightly flattened, and pointed at the apex. Diameter two and one-half inches; color dark reddish-yellow; skin a little roughened; crisp, light brown flesh, sweet and excel

lent. One of the best, very early shippers; a free grower and regular and heavy bearer.

Okame. Round or oblate, with dark lines about the apex. Vertical diameter two and one-half inches, cross-section three or more. Clear waxy skin of a deep yellow color, changing to red and mantled with bloom. Interspersed in the light flesh are a few brown patches enveloping the seeds. Ripens in September, and lasts a month. One of the handsomest; quality excellent; tree strong and productive.

Hachiya. (Yamato, Imperial.) One of the largest and most showy. Slightly lengthened, conical and pointed; three and three-quarters inches vertical by three and one-quarter transverse diameter; skin bright crimson with lines and markings at apex. Flesh light, with dark spots enveloping the few seeds. Very good when ripe after losing astringency. Tree vigorous and handsome, and a moderate bearer. Last of September. Fig. 821.

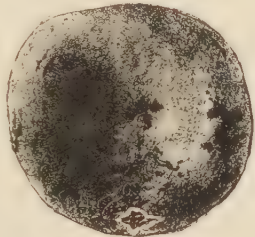


FIG. 820.—Zengi-Maru.

Yemon. (Among.) Flattened like a tomato, with depressed apex; occasionally deeply ribbed; two and one-half inches vertical by three transverse diameter; often much larger; skin dark yellow-

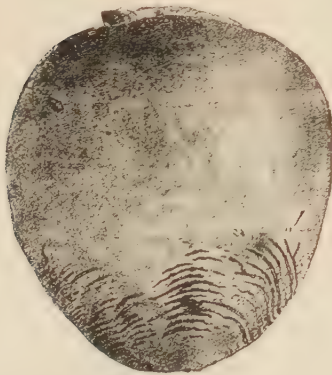


FIG. 821.—Hachiya.



FIG. 822.—Yemon.

ish-red; flesh dull red with brown spots around the seeds, of which there are sometimes a few; clear yellow when seedless. Very sweet, juicy, and one of the best. Tree of moderate size, robust, and bears well. Ripens last of September; good keeper; very desirable. Fig. 822.

Hiyakume. Large, round, generally flattened, but sometimes slightly

elongated; three to four inches in diameter; skin yellow with network of lines around the apex; flesh dark, solid, and sweet without astringency. Very desirable for market; tree strong-growing and prolific. Last of September. Fig. 823.

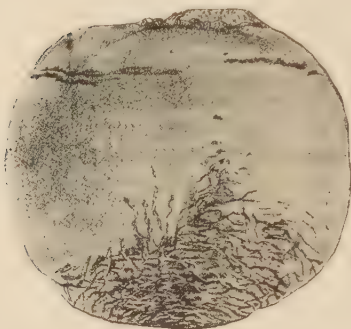


FIG. 823.—Hyakume.



FIG. 824.—Tanenashi.

Tanenashi. (Seedless.) Often very large, slightly conical and pointed; diameter three and one-half inches or more; skin clear bright orange; flesh golden yellow; soft and rich without seeds. Tree of moderate size, good grower and bearer. Fruit generally perfect and handsome, making it one of the most profitable market varieties. Last of September. Fig. 824.

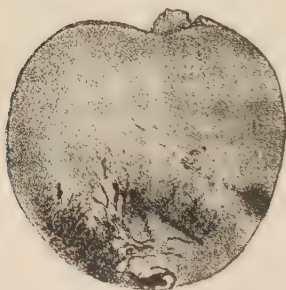


FIG. 825.—Yeddo-ichi.



FIG. 826.—Tsuru-no-ko.

Yeddo-ichi. (Maru-gata.) Round or slightly oblong; depressed at apex; skin very dark red, with heavy bloom; flesh dark brown, almost purple; sweet, crisp, and juicy; edible while hard. Strong upright grower, producing fruit abundantly in clusters. Fig. 825

Kurokuma. Round or flattened; three to three and one-half inches diameter; from three-quarters pound to one pound in weight; flesh yellowish-red. Late keeper and of upright habit.

Mazelli. (Miyotan.) Spherical or slightly elongated; diameter two and one-half inches; skin orange-red; flesh dark reddish-brown; edible before softening. Moderate grower and heavy bearer. Ripens in October and keeps late.

Costata. So called from its ribbed exterior; medium; pointed at apex; vertical diameter two and one-quarter inches, transverse two and one-half; skin buff-yellow; flesh light, good when soft. Ripens late and keeps well. Strong, upright, and very handsome tree.

Tsuru. (Minokaki.) Extremely elongated and pointed; vertical diameter three and one-half inches, transverse two and one-half; skin deep crimson, sometimes mottled with black at the apex; contains a very few seeds enclosed in a dark pulp; astringent until soft. Tree very vigorous and productive, with long glossy leaves. The latest of all to ripen its fruit, which clings to the branches long after the fall of the leaves. Fig. 826.

CHAPTER XLIII.

THE PINEAPPLE.

The Pineapple (*Ananassa sativa*), which Lindley says "is universally acknowledged to be one of the most delicious fruits in existence," was found by the early discoverers growing wild in tropical America, from whence it has spread over all the warmer regions of the globe. As we naturally expect to find fruits upon trees or bushes, it seems an anomaly to see two of the choicest, this and the banana, growing like vegetables, the former on a stalk from one to three feet high, much after the fashion of an humble and unpretending cabbage; yet these two have risen so greatly in popular estimation as to be regarded only second in importance to the orange and lemon. Europe draws its chief supply of pineapples from the Azores or Western Islands as the nearest source, and the United States from the Bahamas and Florida, although some come from greater distances. Since the advent of steam-carriage they reach these markets in a more matured and better condition than was possible by the sailing-vessels of former days. Then they were considered rarities, and many were grown with much labor and expense in hot-houses, a branch of horticulture which attained the importance of a science by itself, and no large establishment was considered complete without its pinery.

Few people in temperate climates have an adequate conception of the surpassing excellence of a pineapple ripened on its stalk and eaten just at the turn, when the deep yellow pulp becomes almost as deliquescent as an orange. A pine is more easily eaten and tastes better when sliced perpendicularly instead of transversely, but a perfectly ripe one is almost too mellow for slicing.

In addition to possessing remarkably nutritive properties, scarcely inferior to those of lean beef, the juice is a wonder-

ful digester, and has been made the basis of an extract of undoubted efficacy in relieving stubborn cases of dyspepsia. It will also quickly dissolve and disperse the obstructions in the throats of diphtheritic patients. Thin people who do not properly assimilate their food soon gain flesh and strength on a diet of ripe pineapples. The long, narrow leaves contain an abundance of one of the best fibres known, being strong, flexible, soft, and silky.

On the Florida Keys the regular crop becomes ripe enough to cut in April, the season lasting for several months; but a few are coming in at all times. Those that mature under sheds in the winter often bring five times the price of others. The fruit is taken off with long, sharp knives, and carried out in baskets holding four or five dozen. The first crop is considered the best for size and quantity, except under intensive cultivation, which causes progressive improvement. It is packed for shipment in crates the size of a barrel, which when full weigh about one hundred and sixty pounds. One hundred crates to the acre is called an average, and one hundred and twenty-five a large yield of the common kinds, which run fifty to eighty in a crate; but some fancy varieties, like Porto Rico, Smooth Cayenne, Queen, or Abbaka, are much larger. Often twelve Porto Ricos will fill a crate, and specimens of twenty pounds in weight have been gathered. Those too small for shipment are canned and preserved, or made into cider and vinegar. As before remarked, a valuable medicine is prepared from the juice, which may also be distilled into brandy. The pines grown on the mainland of Florida are more tender, sweet, and succulent than most of those from other countries.

PROPAGATION.

Like the banana, the pineapple originally produced seed freely, but renewal by offsets through a long course of years has caused these seeds nearly to disappear. Of a dark color, and about half as large as those of an apple, they may be found interspersed in the pulp near the crown. New varieties are started from these or from the offsets of cross-fertilized plants. The writer once saw a Black Jamaica apple on a smooth Cay-

enne stalk, the result of crossing, the effects of which probably extended to the crown above and the slips immediately below it. Plants are multiplied by the crown at the top of the fruit, the slips which cluster about its base, the suckers near the foot of the stalk, or the ratoons from the root. If the



FIG. 827.—Manner of Growth of Pineapples.

variety be scarce and valuable, additional plants may be produced from cuttings of the stem, which contain dormant axillary buds, but these are slow in sprouting and require a long time to become established. Suckers are preferred as being much the strongest and soonest to arrive at maturity. Ripe apples may be expected from them in twelve months, and from slips and crowns inside of two years. Each stalk bears but once and is renewed by the suckers, which, except in a plant of extraordinary vigor, should

be thinned out to one or two; if more are left the fruit will be small and inferior. The natural increase of the pineapple is exceedingly rapid. Starting with a single fruiting plant, and using all the slips and suckers as they mature, it has been estimated that, if all grew, the number in a dozen years would occupy more than sixteen acres, allowing ten thousand plants to the acre.

CULTIVATION.

Exemption from frosts in winter, combined with a season of prolonged heat in summer, are requisites to success. From seventy degrees to seventy-eight degrees may be considered

a nappy mean. Countries, even through frostless, where summers are cool, are unfavorable. Where there is sufficient heat, but occasional frosts and even light freezes of a few hours duration in winter, pines have been found to do very well when planted under partially open screens. In parts of Florida where such conditions prevail, they are successfully and extensively grown under these structures, composed of a cover of thin slats set a few inches apart, and supported by posts and cross-pieces six feet above the ground and eight or ten feet apart from each other. Thus sheltered, no effects of frost will be seen, even when a thin glaze of ice forms outside, and in a hard freeze the damage will be greatly lessened. The covering also serves as a protection against the rays of a sometimes too ardent sun, besides preventing excessive evaporation of moisture from the ground. Even where there is no need of erecting these sheds to keep off frost, the plants have been found to grow more luxuriantly under them than in the open air. This seems reasonable when we reflect upon their surroundings in a state of nature, where they flourish under the shade of lofty forest-trees, falling over as the fruit ripens, and the offsets rooting in the cool and mellow soil. Farther north, where these screens would be inadequate, a temporary scaffold, built lower and just over the plants, and covered with straw or matting during cold weather, will be found an effectual safeguard. During intermediate warm periods, this can be partially removed or lifted to let in light and air, and after winter has passed taken away entirely. Such an arrangement will answer a good purpose where one does not care to go to the expense of glass, and it is surprising how easily, in mild latitudes, a liberal supply of excellent fruit can be thus obtained.

Soils.—Although the pineapple seems to prefer a light and well-drained sand, rather poor than naturally rich, it will grow in a great variety of soils. Damp and heavy ground is ungenial. It flourishes on the rocky limestone formation of the Bahama Islands and Florida Keys, and in the loose sands of the interior, but does not thrive where there is a large admixture of small or broken shells. Like an air-plant, it is able to endure long-continued droughts without much harm, but plenty of water is necessary while the young sets are rooting,

or they may become stunted or seriously retarded. Being a voracious feeder, a liberal dressing of strong nitrogenous fertilizers will promote an astonishing luxuriance of growth, causing the leaves to stand often six feet high, and the fruit to swell with fatness. From one to two thousand pounds per acre every year of blood and bone, fish guano, or cotton-seed meal are recommended as continually improving the quantity, quality, and size of the fruit. Even three times the above amount has been used to advantage, and the results are better if the materials are made into a compost and well rotted before application. The Florida soft phosphate, combined with kainit or potash salts and cotton-seed meal, makes a very effective and complete fertilizer. There are also some excellent formulas gotten up expressly for the pineapple by manufacturers of the best commercial manures. By this course of liberal feeding, plantations do not become exhausted in a few years as they otherwise would, but steadily improve, bidding fair to last for an indefinite period. The first year's crop should average ninety per cent and that of the second year one hundred per cent, or more if several suckers are left to a stalk. Some water is needed, and this is generally supplied by the rains. Much is drawn up by the tap-roots from below and no small quantity is caught in the shape of dew by the long concaved leaves, and conveyed by them directly to the stalk and roots.

Setting.—Before setting, the ground should be thoroughly loosened and fertilized. The offsets are prepared by stripping away a few of the leaf-butts and paring the ends smoothly, which helps the formation of tap-roots. This brings the embryo roots into close contact with the soil and encourages them to strike at once. If not done, they will be slower in starting, and some may not start at all. This is the general practice, but a few growers deem this cutting and trimming to be unnecessary, and plant with the lower leaves spread out and covered with soil, which is firmly tramped around the stalk. The sets should be planted on a level—slips about three inches deep; suckers four to six inches. The centre or bud must be left high enough above the ground to avoid as much as possible the washing in of sand, which may check or even kill the plant. A pinch of cotton-seed meal dropped in as-

sists in keeping out the sand, and helps to fertilize. Eighteen to twenty inches apart is considered a good distance, with a wider space at short intervals for convenience in passing through and gathering the fruit. Farther apart they do not support and shade each other, and the fruit is liable to fall over and break off, or spoil and sunburn. From twelve to twenty thousand plants are set to the acre. The offsets are planted as fast as they become large enough, preferably during the summer and fall months, when the moisture needed for root development is supplied by showers. It is of great importance that they should strike quickly and grow off at once; should they become stunted the fruitage is correspondingly diminished and retarded.

While the plants are young the cultivation must be thorough and shallow, care being taken not to cut the feeding roots, which run near the surface. A wheel-hoe is an effective implement before the leaves begin to spread. Until some length of stalk is made, sand will be liable to wash into the bud during heavy rains, and if not removed check the growth. It may be forced out by pouring in water from the height of a few feet, and a little cotton-seed meal dropped in afterward will assist in keeping it out for some time. By the second year the leaves cover the ground and no further cultivation is needed. Fertilizers can be applied by sowing broadcast.

Mulching is not recommended for the reason that it increases the liability to injury by frost. After producing for six or eight years, a pineapple-field does better to be entirely reset with fresh young plants.

DISEASES.

Spike or long leaf is a condition sometimes produced by rank unfermented manures, or other causes, and recognized in stunted plants with long and very narrow leaves. These will never fruit, and should be replaced by young and healthy suckers. It is well for a pineapple-field to be laid out in squares, with alleys between broad enough to head off fire, which, should it get in during a dry time, could not otherwise be checked and would lay waste the whole.

If there is trouble from *mealy-bug*, *red spider*, or *white scale*, spray every week with a good insecticide until the pest disappears. The red spider works around the base of the stem, causing it to decay and break off.

VARIETIES.

Among the numerous varieties, those which have been selected for extensive planting as being the most delicious, hardy, and best shippers are Red Spanish, Smooth Cayenne, Porto Rico, and Queen.

Abachi (Abbakacha), called Abbaka for short, and sometimes Brazilian, from the country of its introduction. A tall growing plant, with narrow dark-green purple-tinged leaves. Fruit a rich golden yellow; weighs five to ten pounds; in quality fully equal to Cayenne, but more tender and difficult to ship.

Cayenne. (Smooth Cayenne.) Flowers purple; fruit cylindrical and slightly conical; dark orange, with pale yellow, rich and highly flavored flesh. Excellent for winter fruiting and one of the most juicy; weight six to ten pounds. Of robust growth, with long and broad dark-green leaves, nearly free from spines, which is a great convenience in handling and working. Makes few offsets, and can therefore be increased slowly. Very extensively cultivated in the Azores and Sandwich Islands.

Porto Rico. (Trinidad, Pitch Lake.) A very robust plant, producing perhaps the largest fruit of any; generally averaging eight to fifteen pounds, and sometimes larger. Of fair quality and flavor, and a good shipper.

Queen. This is the Queen *par excellence*, and the mother of the whole family of Queens, many names of which, as Lemon, Victoria, Golden, Egyptian, and Gipsy Queen, are synonyms. One of the first seedlings raised in England. The family is distinguished by an indescribably peculiar aromatic flavor, and pointed conical shape of the pips, which are usually flattened in other sorts. Next to the Spanish it is the most extensively cultivated, being every way desirable, and perhaps the best for general purposes. The plant is free growing, compact and handsome, coming quickly to maturity. Fruit of an attractive yellow color, very juicy, of exquisite flavor and a good keeper; weight three to eight pounds, and brings about double the price of the Spanish.

Spanish. (Red Spanish, Key Largo, Red Pine, Havana, Cuban, Black Spanish, and Strawberry.) Size of plants medium; leaves broad and sharply serrated; fruit short and rounded; large pips or protuberances, of a very dark color, changing to a reddish-yellow when ripe. Usual weight two to six pounds; sub-acid,

juicy, and good ; hardy and early. This is the favorite for market and more largely planted than all others put together.

Besides the above are many cultivated on a small scale by way of experiment. The best are **Enville, Albert, Antigua, Jamaica, Rothschild, etc.**

CHAPTER XLIV.

THE POMEGRANATE.

THE Pomegranate (*Punica granatum*) in flower, fruit, and foliage is one of the most graceful and beautiful shrubs in existence. A native of Persia or Northern India, and often alluded to in Scripture, it has been admired and cultivated from the earliest times. At the present day it is met with in most of the warmer parts of the globe, but does not appear to be grown for commercial purposes to any great extent, perhaps because it is not a profuse bearer, and the fruit, enclosed in a thick and bitter rind and containing many seeds, is less easily eaten than most others. As an ornamental shrub it is a great favorite, and the dwarf double-flowering varieties make a gorgeous display when in full bloom.

The crimson pulp enveloping the seeds is always agreeable and refreshing, besides being extremely cooling and grateful to patients suffering from fever. The astringent skin possesses tonic properties, while the bark of the tree is used for tanning morocco leather, and that of the root is an effective vermifuge.

PROPAGATION

is readily effected by seed, layers, or cuttings. The branches are slender, sometimes thorny, and clothed with narrow, light green leaves two or three inches long. Flowers of good size with a thick, fleshy calyx, and petals of a delicate texture and curled or crimped; the whole of a deep scarlet color. The fruits often grow to the dimensions of a large apple, and are exceedingly handsome and attractive; the leathery rind being golden yellow, or nearly pure white with a light or dark blush. The tree is hardy generally all over the Gulf States and a little farther north, and is perfectly at home in Arizona, New Mexico, and California. The sour varieties seem able to

bear more cold than the sweet. There is no doubt that if the best sorts from the Orient were naturalized here, they would become very popular; especially as the trees are so easily grown and seem to have no diseases or enemies. We are told of kinds in Persia and Asia Minor almost seedless and nearly as large as a human head.

At present in Southern California and the Gulf States, besides the common sweet and sour varieties, we find the following, thus described:

VARIETIES.

Caribbean. Large, yellow, with crimson blush; skin thick but soft and leathery; a good shipper; pulp pink and aromatic. Ripens in June.

Paper-Shell. A new variety of extra fine quality, with a very thin skin; valuable for home consumption.

Ruby. (Purple Seeded.) Fruit as large as the largest apple; skin yellow with crimson blush; pulp deep rich crimson; very sweet and aromatic. Good grower, bearer, and shipper.

DESCRIPTIVE LIST AND INDEX OF FRUITS.

[The following list contains the names of most of the varieties of fruits cultivated in the United States, either local or widely disseminated, with brief notices of new sorts not described in the body of the work and older varieties which are superseded and are passing out of cultivation, but are retained in the lists as a matter of pomological history. References from one name to another are always to synonyms.]

APPLES.

- Abbott, or Abbott's Sweet.** Medium, roundish, striped; of moderate flavor. Winter. N. H.
- Abram.** Rather small, roundish, yellow and red; sub-acid, good. Winter. Va. and N. C.
- Acuba-leaved Reinette.** Medium, oblate, red and yellow; tender, sub-acid, good.
- Adams.** Large, oblate, faintly striped; flesh greenish-white, of pleasant flavor. Winter. Union County, Pa.
- Adams Pearmain.** Medium, conical, greenish-yellow and gray russet; flesh yellowish, aromatic. Early winter. Foreign.
- Agnes.** Rather small, flattened, striped; spicy, sub-acid, good. Late summer. Pa.
- Ailes, p. 322.**
- Albermarle Pippin of Va.** See Yellow Newtown Pippin.
- Alerson's Early.** Medium, round, yellow, good. Summer.
- Alexander, p. 308.**
- Alfriston.** Large, roundish-oblong, ribbed, green; sub-acid, of moderate quality. Autumn, Foreign.
- All-summer Apple.** Rather small, roundish, greenish white; flesh white, crisp, pleasant. July, August. Pa.
- Allen's Choice.** Medium, roundish-oblate, striped; coarse, aromatic, good. Winter. Pa.
- Allum.** (Hallum, Rockingham Red.) Medium, oblate, irregular, red; brisk acid. Long keeper. North Carolina.
- American Beauty, or Sterling Beauty.** Medium, roundish, deep red; rich, vinous. Winter. Mass.
- American Golden Pippin.** See Golden Pippin of Westchester Co.
- American Golden Russet** See Bullock's Pippin.
- American Pippin, or Grindstone.**

- Medium, roundish-oblate, regular, dull red; very hard, dry. Long keeper.
- American Red Juneating. See Early Strawberry.
- American Summer Pearmain, p. 299.
- Angle. Medium, roundish, striped; sweet. September.
- Anglo-American. Medium, roundish-conic, striped; sweet, aromatic, very good. Late summer. Canada West.
- Anis, p. 322.
- Anisim. Medium, yellow, splashed and striped crimson. Very hardy and sure bearer. Russian.
- Anisovka, p. 322.
- Antonovka, p. 337. The varieties of this family received from different parts of Eastern Europe vary somewhat from each other, and are difficult to separate from the apple usually imported under this name. Russian.
- Api. See Lady Apple.
- Apple of Commerce. See Pead.
- Arabskoe, p. 337.
- Arbroath Pippin. See Oslin.
- Arkansas Black Twig, p. 322.
- Arnold's Beauty. Medium, bright yellow, flesh firm, juicy, rich. Late winter. Ontario.
- Aromatic Carolina, p. 300.
- Ashland. Medium, roundish-oblate, striped dull red; mild sub-acid. Early winter.
- Ashmore, or Red or Striped Ashmore. Rather large, roundish-oblate, red; crisp, sub-acid. Autumn. Showy—market. Ohio Valley.
- Ashton. Small, roundish, red, flesh white, tender, sweet. Early winter. Ohio.
- August Apple. See Early Pennock.
- Augustine. Large, roundish-conic, striped; sweet, dry. August.
- Aunt's Apple. Rather large, roundish, striped; sub-acid, musky, good. Early winter.
- Aunt Hannah, p. 337.
- Austin Sweet. Medium, roundish, yellow, rich, sweet, very good. Autumn. Pa.
- Autumn Bough. See Autumn Sweet Bough.
- Autumn Pearmain, or Winter Pearmain. Rather small, roundish-oblong, dull red, stripes small; crisp, dry, rich, and high flavored. Autumn and early winter.
- Autumn Pippin. Rather large, oblong conic, with a brownish cheek; pleasant, sub-acid. Early winter.
- Autumn Seek-no-further. Medium, roundish-oblate, green, faintly striped; juicy, tender, sub-acid, very good. October.
- Autumn Strawberry. See Late Strawberry.
- Autumn Swaar, p. 306.
- Autumn Sweet Bough, p. 307.
- Averill. Rather large, conic, irregular, ribbed, striped; pleasant, sub-acid. Long keeper. Conn.
- Babbitt, p. 322.
- Bachelor. See Buckingham.
- Bachelor's Blush. Rather large, oblate, stalk very short, green-

- ish-yellow with a blush; rather acid, good. August.
- Baer, p. 322.
- Bagby Russet, or Egyptian Russet. Medium, slightly conic, light russet on yellow; tender, fine-grained, juicy, sub-acid, aromatic, rich, excellent. Winter.
- Bailey's Golden. Large, oblong, yellowish, slightly russeted; flesh white, pleasant, sub-acid. Winter. Maine.
- Bailey's Spice, p. 315.
- Bailey Sweet, p. 319.
- Baker. Large, roundish, striped crimson, rather coarse; pleasant, sub-acid, very good. Productive and profitable. Conn.
- Baker's Sweet, or Winter Golden Sweet. Medium, roundish, rich yellow; rather coarse, rich. Early winter. Conn.
- Baldwin, p. 323.
- Baltimore. Medium, roundish, striped purplish red; sub-acid, very good. Winter.
- Baltimore Pippin. See Fallawater.
- Baltzby. Large, oblate, yellowish-white; firm, almost sweet. October. Va.
- Barbour. Medium, roundish-oblate; striped; pleasant, very good. Pa.
- Barrett. Rather large; conical, striped red on yellow; pleasant, aromatic, nearly sweet. Winter. Conn.
- Bars. Rather large, roundish, pale yellow, marbled red; mild, pleasant, rich. Late summer. Rhode Island.
- Basil the Great, p. 337.
- Beach (Lady Pippin). Medium, roundish, irregular, greenish-yellow, splashed red, flesh yellowish, tough, juicy, sub-acid. Ark.
- Bean Sweet. Medium, oblong ovate, white, handsome; crisp, juicy—baking. Autumn and winter. Little known.
- Beautiful Arcad, p. 298.
- Beauty of Kent, p. 308.
- Beauty of the West. Large, roundish, regular, striped; sweet, pleasant, of moderate flavor. Autumn.
- Bedfordshire Foundling. Large, roundish, green; pleasant, acid—cooking. Autumn and winter. English.
- Beefsteak, or Garden Apple. Medium, oblate, somewhat oval, striped; mild, pleasant, sub-acid. Autumn. Mass.
- Belden Sweet. Rather small, conic, angular, yellow with a blush; flesh white, pleasant, aromatic. Winter. Conn.
- Belle de Boskoop. Above medium, roundish, shaded and obscurely striped red on yellow skin; crisp, juicy, brisk sub-acid, rich, very good. Late winter. Russian.
- Belle et Bonne, p. 337. [Another Belle Bonne (called also Billy Bond) is cultivated in Western New York, and is a medium, roundish-conic, striped apple, rather coarse, and good for cooking.]
- Belle-Fleur. See Bellflower.
- Belle-Fleur Rouge, or Red Bellflower. Large, oblong conical,

- striped; of moderate or poor flavor. Winter.
- Bellerdovskoe, p. 315.
- Bellflower. See White and Yellow Bellflower.
- Bell's Early. See Sops of Wine.
- Bell's Scarlet Pearmain. See Scarlet Pearmain.
- Belmont, p. 337.
- Belzer. Medium, striped red on greenish-yellow; flesh white, sub-acid. August. Ohio.
- Ben. See Eustis.
- Ben Davis, p. 343.
- Benoni, p. 300.
- Bentley's Sweet, p. 319.
- Bergamot, p. 338.
- Berkshire Spy. Medium, roundish-conical; red striped, good. Early winter.
- Berry, or Red Hazel. See Nickajack.
- Bethlehemite, p. 343.
- Betsey's Fancy. Rather small, oblate, yellow, shaded dull red; mild sub-acid. Winter.
- Better than Good, or Juicy Bite. Medium, oblate, pale yellow; tender, mild, sub-acid. Early winter. Pa.
- Bevan, or Bevan's Favorite. Medium, roundish-oblate, striped red and yellow; flesh firm, sub-acid. Late summer. N. J.
- Bietigheimer, p. 315.
- Biggerstaff. Large, striped; flesh yellow, sweet. Autumn. N. C.
- Billy Bond. See Belle et Bonne.
- Billy's Pippin. Large, round ovate, red on yellow; sub-acid, rich, very good. Autumn.
- Black Apple. See Jersey Black.
- Black Coal. Rather large, roundish, irregular, dark red with white dots; flesh white, a little stained, rather acid. Early winter. Western. See Hoover.
- Black Gilliflower, p. 343.
- Black Lady Apple, resembles the Lady Apple in size and form, but is nearly black, and has a poor flavor.
- Black Oxford. Below medium, roundish-oblate, dark red; flesh compact, not juicy, mild sub-acid. Valued as a good bearer and keeper. Maine.
- Black's Annette. Small, roundish, dark red. Autumn. Kentucky.
- Black Detroit. See Detroit.
- Black Twig. Medium, oblate, yellow shaded with red, tender, mild sub-acid, very good. Early winter. Tennessee.
- Blackwood. Medium, roundish-conic, green with red blush, cavity large, stem medium, slender, basin medium; flesh yellowish, juicy, sub-acid. Winter.
- Blake. Rather large, roundish, greenish-yellow; crisp, juicy, good. October to January. Maine.
- Blakely. Large, oblate, regular, yellow with a sunny cheek; flesh mild, sub-acid, pleasant. Winter. Vt.
- Bledsoe, or Bledsoe Pippin. Very large, oblate, regular, somewhat conic, striped; flesh white, fine-grained, pleasant, sub-acid. Winter. Ky.
- Blenheim Orange, or Blenheim

- Pippin. Large, roundish, striped dull red; flesh yellow, breaking, flavor moderate. Autumn. English.
- Blockley. Rather large, roundish, oblate, ribbed, yellow; flesh yellowish, compact.
- Blood. Medium, roundish, ribbed, striped dull red; breaking, mild, good. Winter. Ohio.
- Blue Pearmain, p. 324.
- Blue Sweet. Medium, roundish, slightly conical, striped dull red; flesh white, fine, not juicy. A long keeper. Mass.
- Blush June. See Carolina Red June.
- Blushed Calville, p. 315.
- Boalsburg. Large, oblong, slightly conical, striped; flesh yellow, with a very good refreshing flavor. Winter. Pa.
- Boardman, p. 324.
- Boas. Medium, roundish, oblate, striped; good. Late winter.
- Bohannan. Medium, roundish, slightly conic and flattened; yellow with red cheek; tender, juicy, sub-acid, of moderate flavor. July and August. Southwestern. Popular.
- Boiken, p. 338.
- Bonum, p. 308.
- Borovinka. See Sweet Borovinka.
- Borovitsky. Medium, roundish, striped; firm, sub-acid. August. Russian.
- Borsdorff. Small, roundish-oval, yellow with a red cheek; flesh firm, crisp, rich, brisk, perfumed. Early winter. German.
- Boston Russet. See Roxbury Russet.
- Bough. See Sweet Bough.
- Bourassa. Medium, roundish-conic, rich orange russet, tender, aromatic, good. Early winter.
- Bowen. (Bowen's Favorite.) Medium, roundish-oblate, red. Autumn.
- Bower's Nonpareil. Large, oblate, yellow and red. Good. Winter.
- Bowker. Medium, roundish-oblate, yellow and crimson; tender, sub-acid. Autumn.
- Bowling's Sweet. Medium, roundish, dull red; rich, sweet. October to January. Va.
- Boxford. Medium, oblate, striped, not juicy nor high flavored. Autumn.
- Brabant Bellflower. Large, roundish-oblong, striped; rich, sub-acid. Late autumn. Holland.
- Brenneman. Medium, striped; flesh white; sub-acid—cooking. Late summer. Pa.
- Breskovka. Medium, conical, yellow; red blush, cavity broad, stem long; basin narrow, ribbed; flesh white, sub-acid, good. Autumn. Russian.
- Brewer. Very large, roundish, yellow; flesh yellowish; pleasant, sub-acid. Autumn. Mass.
- Brier. Medium large, round, yellow and red; good. Misseason. Wisconsin.
- Brier Sweet Crab. See Van Wyck.

- Briggs' Auburn. Large, oblate, light yellow; sub-acid. September, October. Me.
- Brightwater, p. 324.
- Brittle Sweet. Rather large, roundish; crisp, sweet, very good. Autumn.
- Broadwell, p. 320.
- Brookes' Pippin, p. 338.
- Bryant, p. 324.
- Brown. Large, oblate, red striped, good. Late autumn.
- Buchanan's Pippin. Medium, oblate yellow, shaded maroon; flesh greenish; crisp, refreshing, sub-acid. Late winter. Ohio.
- Buckingham, p. 308.
- Buckley. See Chenango Strawberry.
- Buck Meadow. Above medium, roundish, streaked; sub-acid, rather rich. Winter. Conn.
- Bucks County Pippin. Large, roundish, slightly oblate and oblique, greenish-yellow; firm, slightly sub-acid. Pa.
- Buff, p. 324.
- Buffington's Early. Rather small, oblate, light yellow; fine, sub-acid, excellent. Summer. A poor bearer.
- Bullet, p. 324.
- Bullock's Pippin, p. 338.
- Buncombe or Bunkum. See Red Winter Pearmain.
- Burlington Pippin. Full medium, roundish-oblate, striped, flesh white, mild sub-acid, very good. Early winter. Vt.
- Burnhap Greening. Medium, roundish, greenish-yellow; crisp, sub-acid. Early winter. Vt.
- Burr's Winter Sweet. Medium, oblate, striped; aromatic. Winter. Mass.
- Bush. Rather large, oblate, greenish-yellow; pleasant. September. Pa.
- Butter. Rather large, roundish-oblong, yellow, fair; sweet, rich—cooking. Autumn. Pa. Several of this name.
- Byer's. See Buckingham.
- Byram's Sweet. Medium, oblate, yellow; sweet; pleasant flavor. October.
- Cabashea. Very large, oblate, striped dull red; coarse; sub-acid. Early winter.
- Cabbage-head. Large, yellow, coarse, crisp, sub-acid. Good. Vigorous and productive. N. J.
- Cadwallader. (Cadwallader's Golden.) Medium, roundish-oblate; yellow. Winter.
- Cain, or Cane. See Kane.
- Calef's Sweet. Very large, roundish, yellow; sweet, rich. November to January. N. H. Valuable.
- Calkin. (Calkin's Pippin.) Large, roundish conical; yellow and red. Winter.
- Callasaga. See Cullasaga.
- Camak's Sweet, p. 320.
- Campfield, or Newark Sweeting. Medium, roundish-oblate, smooth, striped; firm, not juicy; rich, sweet. Keeps long. N. J.
- Canada Baldwin. Medium, roundish oblate, striped rich red on a white skin; flesh white, with a mild sub-acid,

- quince-like flavor. Winter. Quebec.
- Canada Pippin. See White Pippin.
- Canada Reinette, p. 338.
- Cane Creek Sweet. Medium, round, yellow. Summer.
- Cann, or Sweet Cann. Large, conic, greenish, dull cheek; sweet, pleasant. Winter.
- Cannon Pearmain, p. 324.
- Capron's Pleasant, p. 315.
- Carnahan's Favorite, p. 324.
- Carnation, p. 308.
- Carpenter's Sweet. Medium, roundish-conic, yellow and red, flesh white, sweet, pleasant, rich; mid-autumn, valuable for market. Conn.
- Carolina Red June, p. 300.
- Carolina Red Streak. See Ben Davis.
- Carolina Spice. See Nickajack.
- Carolina Watson, p. 300.
- Carolina Queen, p. 324.
- Caroline. Medium, oblate, ribbed, maroon, mild sub-acid. Winter. N. J.
- Carter, p. 324.
- Carter of Virginia. Medium, yellowish, tender, juicy, pleasant.
- Carter's Blue. Large, round-oblate, striped dull red on a greenish skin, with a blue bloom; crisp, rich, aromatic, good. Autumn. Ala. Popular.
- Carthouse, p. 324.
- Cash Sweet. Medium, oblate, conic, whitish; flesh sweet, dry. September.
- Cat-head. Very large, round, pale green, sub-acid. Valueless except for cooking. Autumn. Foreign.
- Cat-head Greening. See Cat-head.
- Cat-head Sweet. Large, roundish conic, greenish-yellow; sweet, not rich. October.
- Catline. Small, oblate, striped; rich, sweet. Autumn. Del.
- Catooga. Quite large, irregular, yellow; sub-acid. Winter. Southern.
- Cat Pippin. Rather large, greenish; sub-acid. Winter. Western Pa.
- Cattall Apple. See Meyer's Nonpareil.
- Cayuga Red Streak. See Twenty Ounce.
- Caywood. Medium oblate, bright yellow; firm, not juicy, nor rich. Keeps into summer. Ulster Co., N. Y.
- Challenge. Large, oblate, deep yellow; crisp, tender, sweet. Good through winter. Great bearer. Ohio.
- Champlain. See Summer Pippin.
- Champion. See Collins.
- Chandler, p. 325.
- Charles Apple. See Male Carle.
- Chattahoochie. Rather small, greenish-yellow; crisp, sub-acid, pleasant. Winter. Georgia.
- Cheeseborough Russet. Large, conical, greenish russet; sub-acid, dry. Of little value. Autumn.
- Chenango Strawberry, p. 308.
- Cherry Crab, p. 348.
- Chester. Medium, oblate, whitish yellow, carmine dots;

- crisp, tender, sub-acid. Good. Early winter. Pa.
- Chief Good. Rather large, roundish, red on light yellow; flesh white, sub-acid, aromatic. September, October. Ky.
- Churchill Greening. Large, oblate conic, ribbed, dull red on yellowish-green; rich, vinous. Winter.
- Claremont Pippin. See Easter Pippin.
- Clarke's Pearmain, p. 339.
- Clark's Prolific. Medium, oblate-conic, pale yellow; flesh white, fine, tender, juicy, sub-acid. Early winter. Tree hardy, very productive. Iowa.
- Clayton. Large, conical, yellow and red. Winter.
- Cloth of Gold. See Drap d'Or.
- Clyde Beauty, or Mackie's Clyde Beauty, p. 309.
- Cocklin's Favorite. Small, roundish, flattened at ends. Good. Pa.
- Cogswell, p. 325.
- Cole, or Scarlet Perfume. Large, roundish-conic, crimson; quality moderate. Summer. English.
- Cole's Quince, p. 303.
- Collins. Large, roundish-oblate, greenish yellow, shaded and striped red, flesh yellowish, solid, coarse, juicy; good. Winter. Ark.
- Colvert. Large, oblate, striped; sub-acid, quality moderate—culinary. Autumn. Succeeds well Northwest.
- Conant's Sweeting. Medium, light yellow; good. Productive.
- Congress. Large, yellow and striped; coarse, acid. Good. November. Mass.
- Connecticut Seek-no-further. See Westfield ditto.
- Connett's Sweet. Large, roundish-oblate, dark red on rich yellow; sweet. Very good. December to March.
- Conway. Medium, oblate, greenish-yellow; crisp, rich, aromatic. January to February.
- Cooper, p. 309.
- Cooper's Early White. Medium, roundish, pale yellow; crisp, sprightly. Autumn. Western.
- Cooper's Red, Cooper's Market, or Cooper's Redling, p. 325.
- Corlies' Sweet. Medium, light yellow; firm, sweet. Good. Great bearer. October.
- Cornell's Fancy, or Cornell's Favorite, p. 309.
- Cornish Aromatic. Medium, roundish, ribbed, red; rich sub-acid, aromatic. Autumn. English.
- Cornish Gilliflower, or Red Gilliflower. Rather large, conic, ribbed; dull stripes; flesh yellow, firm, very rich, aromatic. Winter. English. A poor bearer.
- Corse's St. Lawrence. See St. Lawrence.
- Cos or Cass. Large, roundish-conic, one-sided, striped; mild, agreeable. Winter. Kingston, N. Y.
- Court Pendu Plat. Medium, oblate, regular, deep red; rich, brisk sub-acid. Early winter. French.
- Court of Wick. Small, roundish

- ovate, approaching oblate, greenish-yellow and orange; crisp, juicy, rich. Fails here. Autumn. English.
- Cox's Orange Pippin. Medium, roundish-oblate, yellow with some red over the surface; rich sub-acid, very good. Autumn. Very popular in England.
- Cracking, p. 315.
- Cranberry Pippin. Medium, oblate, with a handsome scarlet cheek; sub-acid, poor—cooking. Productive. Autumn. N. Y.
- Cranford, p. 325.
- Creek. Medium, roundish-conical, greenish-yellow with some red stripes, mild, pleasant sub-acid. Tree very productive. Winter. Pa.
- Crimson Pippin. See Black Detroit.
- Cross, p. 325.
- Cullasaga, p. 325.
- Culp. Medium, conic, ribbed, irregular, yellow with a blush; firm, vinous. Winter. Ohio.
- Cumberland or Cumberland Seedling. Large, roundish oblate; flesh white, sub-acid—market. Pa.
- Cumberland Spice, p. 339.
- Curtis Sweet. Large, oval, ribbed, striped red on pale yellow; tender and pleasant. August to October.
- Dansie Pepka, p. 339.
- Danvers Winter Sweet, p. 321.
- Darlington Russet. Medium, roundish; of moderate quality. A good keeper. Ohio.
- Dartmouth. Medium, yellow; sweet, good. October. Mass.
- Dartmouth Crab, p. 348.
- Davis. Small, oblong, flattened, crimson; crisp, sub-acid. Good keeper. Mich.
- Dawes. Medium, light yellow, tender, sub-acid, very good. Autumn. Vigorous and hardy, and productive alternate years. Mass.
- Dean. Medium, oblate, red streaked, good. Autumn.
- De Bretagne. See Canada Reinette.
- Decaire. Medium, oblate conical, dark rich red on white skin, tender, juicy, sub-acid, with a quince-like flavor. Autumn. Quebec.
- Delaware. See Lawver.
- Delight. Medium, roundish-oblate, russet and crimson; flesh firm, nearly sweet. Very good. Winter. Southern Ohio.
- Democrat. Medium, roundish-conical, striped with crimson; mild, pleasant, sub-acid. Very good, productive. Western New York.
- D'Espagne. See White Spanish Reinette.
- Derrick's Graft. See Richard's Graft.
- Derry Nonsuch. Rather large, oblong, conic, angular, striped; sub-acid, agreeable. Winter. N. H.
- Detroit, p. 325.
- Detroit of the West. See Ortley.
- Devonshire Quarrenden. Medium, roundish-oblate, crimson; crisp, sub-acid. Late summer. English.
- De Witt. See Doctor.
- Dickson's Emperor. Large, ir-

- regular, red; good. Winter. Scotch.
- Dillingham. Medium, roundish-conic, greenish-yellow; sweet. Early winter. Sandusky, Ohio.
- Disharoon, p. 316.
- Doctor, p. 309.
- Dr. Walker. Large, roundish, red, sub-acid. Winter.
- Dominie, p. 325.
- Douse or Dowse. See Hawley.
- Downing's Paragon. Rather large, oblong, oval, light yellow; sweet, aromatic. August. Illinois.
- Downton Pippin. Small, roundish-oblate, yellow; rich, sub-acid. Autumn. English.
- Drap d'Or, p. 316.
- Duchess of Oldenburg. See Oldenberg.
- Duckett, p. 316.
- Dutch Codlin. Large, roundish-oblong, irregular, yellow; sub-acid—cooking. August and September.
- Dutch Mignonne, p. 325.
- Duzenbury. Medium, striped; crisp, tender, mild sub-acid. Very good, productive, keeps into spring. Putnam County, N. Y.
- Dyer, p. 316.
- Early Crofton. See Irish Peach.
- Early French Reinette. See Early Harvest.
- Early Harvest, p. 303.
- Early Joe, p. 300.
- Early Long Stem. Small, oblong conic, greenish-yellow; sub-acid, aromatic. August.
- Early May. See White Juneating.
- Early Norfolk, p. 301.
- Early Pennock, p. 301.
- Early Red Juneating. See Early Red Margaret.
- Early Red Margaret, p. 301.
- Early Ripe. Medium, roundish-oblate, yellow. Summer.
- Early Spice. See Early Long Stem.
- Early Strawberry, p. 301.
- Early Summer Pearmain. See American Summer Pearmain.
- Early Summer Pippin. See Drap d'Or.
- Early Sweet. Medium, roundish, oblique, yellow; tender, sweet. Very good. July and August. Ohio.
- Early Sweet Bough. See Sweet Bough.
- Easter Pippin. Medium, green; firm, dry, sub-acid, good. Keeps two years.
- Eckel's Summer. Large, dark red, sweet. N. C.
- Edgar Red Streak. See Walbridge.
- Edgerly Sweet. See Bailey Sweet.
- Edwards. See Nickajack.
- Egg-top. Medium, oblong oval, striped, handsome; sub-acid, of moderate quality. Autumn.
- Egyptian Russet. See Bagby Russet.
- Eighteen Ounce. See Twenty Ounce.
- Elgin Pippin. Medium, yellow, conical; flesh white, crisp. Ala.
- Elkhorn, p. 326.
- Ellis. Small, roundish, greenish-yellow; firm, pleasant—long keeper. Conn.
- Elton Pippin. See Downton Pippin.

- Emperor Alexander. See Alexander.
- Enfield Pearmain. Rather small, round, deep red; mild, rich. Early winter.
- English Codlin. Rather large, oblong conic, yellow; sub-acid—cooking. Summer and autumn.
- English Golden Pippin. Small, roundish, yellow; flesh yellow, with a rich, sub-acid flavor. Winter. English.
- English Nonsuch. See Nonsuch.
- English Red Streak. See Red Streak.
- English Russet, p. 339.
- English Sweeting See Ramsdell Sweeting.
- English Vandervere. See Smokehouse.
- Episcopal. See Fall Pippin.
- Epsé's Sweet. See Danvers Sweet.
- Epsy. Small, long conic, deep red; sweet, rich, handsome. Productive. Early winter. Vt.
- Equinately. Large, roundish, slightly oblate, dark red or whitish-yellow, stalk short, flesh yellowish, coarse, sub-acid. Valued South.
- Ernst's Pippin, p. 316.
- Esopus Spitzenburgh, p. 334.
- Esten, p. 316.
- Etowah. See Cooper's Red.
- Eustis, p. 326.
- Eve. See Early Red Margaret.
- Evening Party, p. 326.
- Ewalt. Medium, flattened, greenish-yellow, and a red cheek; tender, pleasant, perfumed, very good. April. Pa.
- Excel. Large, oblate, ribbed, red on yellow; rich, sub-acid. Winter. Conn.
- Excelsior Crab, p. 348.
- Exquisite. Below medium, oblate, striped; juicy, rich, pleasant. Autumn. Ill.
- Fairbanks, p. 309.
- Fallowater, p. 339.
- Fall Bough. See Autumn Sweet Bough.
- Fall Harvey, p. 316.
- Fall Jenning. Rather large, oblate, greenish-yellow; sub-acid, pleasant—cooking. November. A great bearer.
- Fall Orange, p. 316.
- Fall or Summer Cheese. Resembles Winter Cheese, but earlier. Va.
- Fall Pearmain. Medium, roundish-conic, striped; rich sub-acid. Autumn. Ct.
- Fall Pippin, p. 316.
- Fall Queen of Kentucky. See Buckingham.
- Fall Seek-no-further, p. 309.
- Fall Stripe. See Saxton.
- Fall Wine, p. 310.
- Fameuse, p. 310.
- Fameuse Sucrée. Nearly medium, roundish-oblate, rich, red, delicate, very good. Autumn. A handsome and excellent dessert apple. Montreal.
- Family. Medium, striped; mild sub-acid, very good. August. Ga. Productive.
- Fanny, p. 303.
- Farley's Red. Oblong oval, striped; firm, pleasant. Winter. Ky.
- Father Abraham. Small, flat,

- red; flesh white, pleasant. Keeps well. Va. and Ky.
- Father Apple. See Pittsburgh Pippin.
- Faust. Medium; sub-acid, good. November. N. C.
- Fay's Russet. See Hunt's Russet.
- Fenley. Large, oblate, irregular, yellowish-white; very good. September. Ky.
- Fenouillet Gris. Small, roundish, yellow and russet; firm, rich, perfumed. Winter. Foreign.
- Fenouillet Rouge. Small, roundish, rough, brownish-red; firm. Autumn. Foreign.
- Ferdinand. Large, oblate, irregular, greenish-yellow. Winter. S. C.
- Ferris. See R. I. Seek-no-further.
- Fink. Medium, oblate, red and yellow. Late winter.
- Fisk's Seedling. Medium, oblate, oblique, deep red; flesh greenish-white, tender, rich. Autumn. N. H.
- Flake's Fall. Large, striped; mild sub-acid, aromatic. Market. October. Pa.
- Flat Pippin. See Pittsburgh Pippin.
- Fleiner. Medium, oblong, yellow; sub-acid, of moderate quality. A great bearer. Autumn. Foreign.
- Florence Crab, p. 348.
- Flower of Kent. Large, roundish conic, red and yellow; sub-acid—cooking. Late autumn. English.
- Flushing Seek-no-further. See Green Seek-no-further.
- Flushing Spitzenburgh, p. 326.
- Ford Apple. Large, roundish, yellow; rich, rather acid. Autumn. N. Y.
- Formosa Pippin. See Ribston Pippin.
- Forney. Rather large, roundish, striped light and dark red, mild sub-acid, good. Late autumn. North Carolina.
- Fornwalder. See Fallawater.
- Fort Miami. Medium or large, roundish-oblong, ribbed, brownish and russeted; sub-acid, spicy. Winter. Ohio.
- Foster, p. 298.
- Foundling, p. 301.
- Fourth of July, p. 301.
- Frank. See Chenango Strawberry.
- Franklin Golden Pippin. Medium, oval, regular, deep yellow; rich, aromatic. Autumn.
- French Pippin. See Newark Pippin.
- French's Sweet. Large, round ovate, greenish-yellow; firm, perfumed, very good. Late autumn. Mass.
- Fronclin. Medium, round, bright red; rather acid. Great bearer. Pa.
- Fulton, p. 340.
- Gabriel, p. 310.
- Gano, p. 326.
- Garden. Small, striped; sub-acid, good. November.
- Garden Royal, p. 301.
- Garden Sweet. Medium, oblong, yellow; juicy, tender, sweet, good. September, October. Hardy and productive.

- Garretson's Early, p. 303.
 Gate. See Belmont.
 Genesee Chief. Large, roundish-conic, ribbed, whitish with red cheek; sub-acid—cooking.
 Geneva Pippin. See Winter Pippin of Geneva.
 Gibb Crab, p. 348.
 Gideon Crab, p. 348.
 Giles. Medium, conic, dark red. Ct.
 Gillet's Seedling. See Rome Beauty.
 Gilpin. See Carthouse.
 Gipson's Kentucky Seedling. Rather small, round ovate, dark red and greenish-yellow; sub-acid. Productive. Long keeper. Ky.
 Gloria Mundi. See Monstrous Pippin.
 Glory of York. See Ribston Pippin.
 Gloucester Cheese. See Fall Cheese.
 Gloucester Pearmain. See Clark's Pearmain.
 Gloucester White. Medium, roundish-oblate, yellow; rich, aromatic. Autumn. Va.
 Goble Russet. Medium, oblong, russet, reddened; dry, sweet. Autumn.
 Goff. Full medium, whitish, tender, brisk sub-acid. Late summer. Ohio.
 Golden Ball, p. 340.
 Golden Dixie. Medium, roundish-oblate, greenish-yellow, good. Summer.
 Golden Goss. Round-oblate, ribbed, yellow; good.
 Golden Harvey. Small, roundish, rough, russety orange; rich sub-acid. Winter. English.
 Golden Pippin. See English Golden Pippin.
 Golden Pippin of Westchester Co., p. 340. [Another Golden Pippin, called also Pound Royal and Mammoth, is very large, yellow; coarse, good. Late autumn. There are still others of this name.]
 Golden Pearmain. See Clarke's Pearmain.
 Golden Reinette. Small, roundish, regular, yellow and orange striped; rich, mild sub-acid. Late autumn. English.
 Golden Russet of New York. See Golden Russet.
 Golden Spice. See Dyer.
 Golden Sweet, p. 299.
 Golden Wilding. Medium, oblate, rich yellow; crisp, acid, good. N. C.
 Good Peasant, p. 327.
 Grandfather. Medium, roundish, oblate-conic, striped and whitish; pleasant, sub-acid. Autumn.
 Grandmother, p. 327.
 Granniwinkle. Medium, roundish-oblong, red; sweet—for cider only. Autumn. N. J.
 Granny Earle. Small, roundish-oval, greenish, striped. Early winter.
 Grand Sachem. See Black Detroit.
 Granite Beauty, p. 327.
 Grape Vine. See Camak's Sweet.
 Gravenstein, p. 310.
 Gray Apple. See Pomme Grise.

- Gray Pippin. See Buel's Favorite.
- Gray Vandevere. See Vandevere.
- Greasy Pippin. See Lowell.
- Green Abram. See Bullet.
- Green Cheese. See Winter Cheese.
- Green Domine. Medium, oblate, dull red; firm, pleasant. Early winter.
- Greening. See Rhode Island Greening.
- Green Mountain Pippin, of Ga. See Virginia Greening.
- Green Newtown Pippin. See Newtown Pippin.
- Green Seek-no-further, p. 340.
- Greenskin. Medium, oblate, greenish-yellow; tender, rich. Early winter. Southern and Western.
- Green Sweet, p. 321.
- Green Vandevere. See Vandevere.
- Green Winter Pippin. See Newtown Pippin.
- Green's Choice. Medium, roundish-conic, striped; nearly sweet. Late summer. Pa.
- Gregson. See Catline.
- Greyhouse. Medium, roundish, dull red; firm, dry—for cider. Winter. N. J.
- Grimes' Golden Pippin, p. 341.
- Grindstone. See American Pippin.
- Groton. See Foundling.
- Gully. See Mangum.
- Haas or Fall Queen. Medium, oblate conic, striped with red; flesh white, juicy, acid, rich, very good. Autumn. Popular at the Southwest. Distinct from Horse Apple.
- Hagloe Crab. Small, distorted—for cider only.
- Hague Pippin. Large, conical, striped deep red, handsome. January. Western.
- Hain. Large, roundish-oblong, striped; sweet, aromatic. Winter. Berks County. Pa. Hall, p. 327.
- Hall's Red. See Hall.
- Hallum. See Allum.
- Hames. Large, round oblate; whitish-striped and blotched with red; flesh whitish, firm, juicy, sub-acid. Summer. Ga.
- Hamilton. Large, round, yellow and red. Autumn.
- Hargrove. Medium, oblate; yellow with carmine cheek; flesh white, crisp, sub-acid, very good. Autumn. N. C.
- Harmony. See Early Pennock.
- Harnish. Medium, oblong oval, dark red; compact, rather dry, sweet. Autumn. Pa.
- Harrigan. See Milam.
- Harris. Large, oblate, yellow; coarse, pleasant, sub-acid. Early autumn. For cooking. N. C.
- Harrison. Medium, roundish-oblong, yellow; dry, tough, rich—for cider. N. J.
- Hartford Sweet, p. 319.
- Harvest Red Streak. Medium, oblate, striped; coarse, acid-cooking. Late summer.
- Haskell Sweet, p. 307.
- Hawley, p. 317.
- Hawthornden. Rather large, oblate, regular, pale yellow;

- pleasant, sub-acid—for cooking. Great bearer. Autumn.
- Hay's Apple, or Hay's Winter. See Wine.
- Heart's Pippin. Medium, roundish, yellow; tender, acid—cooking. November.
- Hector. Large, oblong conic, striped; pleasant, very good. Winter. Pa.
- Heicke's Winter Sweet. See London Sweet.
- Helen's Favorite. Medium, roundish, dark red; flesh white, good. Winter. Ohio.
- Henrick Sweet. See Sweet Pearmain.
- Henry. Large, oblong conic, yellow; rich, pleasant. Late autumn. Vt.
- Henwood Seedling. Large, oblong oval, greenish-yellow; good. January. Western.
- Hepler. Medium, oblate conic, light yellow, shaded dull red; sub-acid. Winter. Pa.
- Herefordshire Pearmain, p. 327.
- Herman. Medium, oblong conic, striped; flesh greenish, sub-acid, very good. Winter. Pa.
- Herren, p. 327.
- Hess, p. 327.
- Hewes' Virginia Crab, p. 348.
- Hewitt's Sweet. Large, oblate, yellow and red; sweet. Autumn.
- Hicks. Medium, roundish, yellow, slightly striped; juicy, rich, sweet, very good. August. Long Island.
- Higby's Sweet, p. 321.
- Highlander. Medium, oblate, slightly conic, green, striped with red; pleasant. Autumn. Vt.
- Hightop Sweet, p. 299.
- Hill's Favorite. Medium, roundish, red; compact, sub-acid, aromatic. Autumn. Mass.
- Hilton. Large, roundish, yellowish-green; sub-acid—cooking. Autumn. N. Y.
- Hinckman. See Newark King.
- Hoary Morning. Large, oblate conic, striped; sub-acid—cooking. Autumn. English.
- Hockett's Sweet, p. 319.
- Hocking, p. 302.
- Hog Island Sweet. Medium, oblate, fine red; sweet, rich, very good. Autumn. Productive. N. Y.
- Holden Pippin. See Fall Orange.
- Hollady's Seedling. Medium, oblate, yellow; rich, aromatic. Winter. Va.
- Holland Pippin, p. 317.
- Hollow Core Pippin. See Ortle.
- Hollow Crown, p. 327.
- Holly. Medium, roundish oblate; yellow and red. Winter.
- Holman. Large, roundish-conic, splashed red, sub-acid, good. Early winter. N. C.
- Homony. See Sops of Wine.
- Honey Greening, p. 321.
- Hooker. Medium, conic, striped; flesh greenish; sub-acid. December. Conn.
- Hoover. Large, roundish, rich crimson with large whitish dots; brisk acid. Early winter. S. C.
- Horn. Small, oblate, green with dark red cheek; flesh firm,

- crisp; good keeper. Winter. Ala.
- Horse, p. 304.
- Horse Block. See Manomet Sweet.
- Housom's Red. Large, oblong, striped; tender, aromatic, very good. October to February. Pa.
- Howe's Russet. Closely resembles Roxbury Russet. Mass.
- Hubbardston Nonsuch, p. 327.
- Hubbardton Pippin. Large, roundish, variable, striped; crisp, pleasant, sub-acid. Winter. N. H.
- Hughes, p. 341.
- Hunge, p. 317.
- Hunter. Medium, roundish-conic, striped bright red; flesh white. October. Pa.
- Hunt's Connecticut. Large, round oblate, yellow and dull red; dry, breaking; sub-acid, good. Winter.
- Huntsman, p. 341.
- Huntsman's Favorite. See Huntsman.
- Hunt's Russet. Small, conic, russet and dull red; fine, sub-acid. Winter. Mass.
- Hurlbut, p. 310.
- Hutchison. Medium, roundish, yellow and red, mild sub-acid, or nearly sweet. Good. Winter. A handsome long keeper. Ky.
- Hyde's Sweet. See Wood's Sweet.
- Hyslop's Crab, p. 348.
- Improved Yellow Bellflower. See Mason's Orange.
- Indian Queen. See Early Pen-nock.
- Indiana Favorite, p. 328.
- Indiana Jannetting. See Rawle's Jannet.
- Indiana Vandevere. See Vandevere.
- Ingram, Seedling of Rawle's Jannet. Medium, conical, flesh red, white spots on surface; good keeper. Mo. p. 328.
- Iowa Blush, p. 341.
- Irish Peach Apple. Medium, roundish, striped, brownish-red; flavor tolerable. August.
- Irish Pippin. Medium, round, red streaked; good. Early winter.
- Jabe. Medium, flattened, yellow with a red cheek; tender, juicy, melting, rich. Hardy and productive. September to November.
- Jabez Sweet. Medium, roundish, dull red; sweet. Winter. Conn.
- Jackson. See Chenango Strawberry.
- Jackson Red. See Nickajack.
- Jacob's Sweet, p. 321.
- James River. See Limber Twig.
- Jefferis, p. 310.
- Jefferson. Rather large, roundish-conic, splashed dull red; sub-acid, very good. Good keeper. Ky.
- Jefferson County, p. 310.
- Jeniton. See Ralls.
- Jenkins. Small, roundish ovate, red with white dots; pleasant, aromatic. Very good. Winter. Pa.
- Jenette. See Rawle's Jannet.
- Jersey Black, p. 328.
- Jersey Greening. See Ortlely.

- Jersey Pippin. Medium, oblong conic, striped; sub-acid, good. December. Foreign.
- Jersey Sweet, p. 306.
- Jewett's Best. Large, roundish or oblate, deep red, flesh yellow, juicy, rich, sub-acid. Early winter. Vt.
- Jewett's Fine Red. See Jewett's Red.
- Jewett's Red, p. 311.
- Joe Berry. See Newtown Spitz-
enburgh.
- John's Sweet. Medium, oblong or conic, striped red on whitish-yellow; sweet, of a peculiar flavor. Winter. N. H.
- Johnson. Rather large, roundish-conic, striped; tender, sweet, becoming mealy. Late summer. Conn. Another Johnson, in Illinois, is oblate, pale yellow and crimson, mild sub-acid, rich, very good. Winter. Productive, and valuable for market.
- Johnson's Fine Winter. See York Imperial.
- Jonathan, p. 328.
- Jones' Pippin. See Fall Orange.
- Jones' Seedling, p. 328.
- Juicy Bite. See Better than Good.
- Julian, p. 302.
- Julin. See Julian.
- July Cluster. Medium, yellow, sub-acid. Va.
- July Pippin. See Early Harvest.
- Junaluska. Large, roundish-conic, yellow; flesh yellow; sub-acid. Winter. N. C.
- Kaighn's Spitzenburgh. Large, oblong, approaching ovate, red; coarse, crisp, sub-acid. Early winter.
- Kaiser, p. 328.
- Kalproth, p. 302.
- Kane, p. 311.
- Kansas Queen. Large, yellow, nearly covered with crimson. Early autumn.
- Keim. Rather small, oblong oval, yellow, sub-acid, aromatic, delicate, very good. Winter. Pa.
- Keister. Small, roundish-conic, striped; pleasant, very good. October. Pa.
- Kelly's Sweet. See Moore's Sweet.
- Kelly White. See Belmont.
- Kelsey. Medium, roundish-oblate, greenish-yellow; flesh greenish-white, tender, pleasant, aromatic, very good. March. Pa.
- Kenrick's Autumn. Large, roundish, striped; sprightly sub-acid. September.
- Kent. See Beauty of Kent.
- Kentish Fill-Basket. Very large, roundish, yellow, slightly streaked; sub-acid—cooking. October, January. English.
- Kentucky. Large, roundish, yellow and dull red; juicy, tender, sub-acid, good. Great bearer. October.
- Kentucky Cream. Medium or above, roundish, largest at apex, yellow and red; mild sub-acid, good. Winter. N. Y.
- Kentucky Queen. See Buckingham.
- Kentucky Streak. See Ben Davis.
- Kernodle's Winter. Medium,

- yellow, blotched and striped red; flesh white, juicy. N. C.
- Kerry Pippin. Medium, oval, yellow; crisp, rich. Autumn. Irish.
- Keswick Codlin, p. 317.
- Ketchum's Favorite. Medium, oval conic, yellow with a blush; mild, rich, very good. Autumn. Vt.
- Key's Fall. Medium, round, russet; good. Early winter.
- Kilham Hill. Rather large, roundish, striped; good at first, becoming mealy and worthless. September. Mass.
- King, p. 329.
- King of the Pippins. Medium, roundish-oblate, striped; rather poor. English.
- King Philip. See Jonathan.
- Kingsbury Russet. See Cheeseborough Russet.
- Kingsley. Medium, roundish-oval, striped; sub-acid, very good. Winter and spring. Monroe County, N. Y.
- King Sweet. Rather small, round-conical, yellow, rich, sweet. Autumn. Maine.
- Kinhead. Large, roundish-oblate, striped red, juicy, mild sub-acid, very good. September. Ohio. New.
- Kinnaird, p. 341.
- Kinnaird's Choice. See Kinnaird.
- Kirkbridge White, p. 304.
- Kirk's Lord Nelson. Rather large, roundish, striped; quality moderate. Autumn. English.
- Kittageskee. Rather small, oblate, yellow; crisp, tender, sub-acid, very good. Winter. Southern.
- Klaproth, p. 302.
- Knickerbocker. Medium, roundish-oblate, greenish-yellow, brisk sub-acid, good. Autumn.
- Knight's Golden Pippin. See Downton Pippin.
- Kohl. Small, roundish—good keeper. German.
- Krowser. Medium, roundish-conic, striped; flesh white, mild sub-acid. Winter. Pa. Productive and popular.
- Lacker, p. 329.
- Ladies' Blush. See Gabriel.
- Ladies' Favorite of Tenn. See Buckingham.
- Ladies' Sweet, p. 319.
- Lady Apple, p. 341.
- Lady Crab, p. 348.
- Lady Finger. See White Paradise.
- Lady Finger Crab, p. 349.
- Lady Fitzpatrick. See Carter's Blue.
- Lady's Fancy. Above medium, oblong conical, yellow and red; agreeable, sub-acid. Early winter. Vt.
- Lady Washington. See Cooper.
- Lake. Small, ovate conic, striped; sub-acid, very good. A great bearer. Ohio.
- Lancaster Greening. Medium, roundish-conic, greenish-yellow; sub-acid—cooking. Good keeper. Pa.
- Landon. Medium, roundish, yellow and red; flesh yellowish, firm, crisp, aromatic, very good. Winter. Vt.

- Landrum. Medium, conic, deep crimson; rather coarse, rich. Autumn. Southern.
- Lane's Red Streak. Large, roundish-conic, yellow, with small stripes; sub-acid, good. October. Illinois.
- Lane Sweet. Medium, oblate, yellow; sweet, aromatic. Winter. Mass.
- Lansingburg. Medium, roundish conic; yellow, with a handsome red cheek; flesh firm, sub-acid, moderately rich--keeps through spring. Ohio. New.
- Large Anis, p. 329.
- Large Romanite. See Pennock.
- Large Striped Winter Pearmain. See McAfee's Nonsuch.
- Large Summer Queen. Quite large, roundish, yellow and red; mild, rich, sub-acid, good. Late summer. N. C.
- Large Yellow Bough. See Sweet Bough.
- Late Baldwin. See Baldwin.
- Late Bough. See Autumn Sweet Bough.
- Late Golden Sweet. See Baker's Sweet.
- Late Queen. Large, roundish conical, pale red on yellow; sub-acid, good. Autumn. Ohio.
- Late Strawberry, p. 311.
- Lawver, p. 329.
- Lead, p. 341.
- Ledenets, p. 341.
- Ledge Sweet. Large, roundish-oblate, yellowish-green with a blush; sweet. A good keeper. N. H.
- Leicester Sweet, p. 321.
- Leland Spice, or Leland Pippin, p. 312.
- Lemon Pippin. Medium, oval, greenish-yellow; sub-acid. English.
- Lewis. Medium, oblate conic, skin yellow, striped; flesh yellow, compact, rich, sub-acid. Early winter. Indiana.
- Liberty. Rather large, oblong conic, striped; flesh yellow; firm, mild sub-acid. Long keeper. Western.
- Lieby. See Recumbent.
- Limber Twig, p. 329.
- Lippincott's Early. See Summer Rose.
- Lippincott's Sweet. Rather large, greenish-white. Productive, keeps till spring, good. N. J.
- Little Pearmain. See Bullock's Pippin.
- Lowland Raspberry, p. 254.
- London Pippin, p. 341.
- London Sweet, p. 321.
- Longfield, p. 341.
- Long Island Russet. Medium round, russet. Winter.
- Long Island Seek-no-further, or R. I. Seek-no-further, p. 312.
- Long John. Large, conical, green, with a dry flesh; a great keeper.
- Long Stem of Conn. is roundish, yellow. Long Stem of Mass. is oblate with a blush. Long Stem of Ky. is oblate, striped.
- Long Stem of Pa., p. 329.
- Long Stem Sweet. See Baker's Sweet.
- Looker Winter Crab, p. 349.
- Lord Nelson. See Blenheim Pippin.

- Lorne. See Marquis of Lorne.
 Loudon Pippin, p. 291.
 Lowell, p. 317.
 Lowland Raspberry, 304.
 Lubsk Queen, p. 341.
 Lyman's Large Summer, p. 304.
 Lyman's Pumpkin Sweet, p. 307.
 Lyscom, p. 312.
- Mackay Sweet. Medium, roundish-conic, yellow, sweet, good. Winter. Mass.
- Mackie's Clyde Beauty. See Clyde Beauty.
- Macomber. Medium, oblate, ribbed, striped; flesh white, tender, sub-acid. Early winter. Maine.
- Magnolia, p. 312.
- Magnum Bonum. See Bonum.
- Magog Red Streak. Medium, roundish-oblong, faintly striped on a light yellow skin; mild sub-acid. Winter. Very hardy. Vt.
- Mahomet. Medium, roundish-oblate, yellow and red; good. Autumn.
- Maiden's Blush, p. 317.
- Maiden's Favorite. Rather small, oblong, whitish-yellow and crimson; pleasant, very delicate. Winter. N. Y.
- Major. Large, roundish, red; flesh yellowish, crisp, pleasant, rich. Pa.
- Male Carle, or Charles Apple. Medium, regular, smooth yellow with a fine cheek, handsome; not rich, pleasant. Autumn. Succeeds South. Foreign.
- Mallett, p. 329.
- Mammoth Black Twig. See Arkansas Black Twig.
- Mamma Beam. See Belmont.
- Mangum, p. 312.
- Manks Codlin. Medium, roundish-oblong, yellow—cooking. August. English.
- Mann, p. 341.
- Manomet Sweet, p. 299.
- Mansfield Russet. Small, oblong conic, cinnamon russet; rich, aromatic. Good bearer and keeper. Mass.
- Marengo Crab, p. 349.
- Maria Bush. Large, round oblate, striped; flesh white, tender, sub-acid. Autumn. Pa.
- Marks. Medium, roundish conic, light yellow; flesh whitish, fine, perfumed, very good. Winter. Pa.
- Marquis of Lorne. Large, roundish-oblate; green, red streaked; good. Winter.
- Marshall. Rather large, roundish, green—market. April to July. Vigorous and productive.
- Marshall Red, p. 341.
- Marston's Red Winter, p. 329.
- Martha Crab, p. 349.
- Martin. See McLellan.
- Mary Wornac. Large, roundish-oblate; yellow and red; good. Winter.
- Mason's Orange. Very large, oblate, yellow. Winter.
- Mason's Stranger. Medium oblate, yellow and red; good. Winter.
- Masten's Seedling Medium, round ovate, greenish-yellow; mild, pleasant sub-acid, agree-

- able. Dutchess County, N. Y. Winter. New.
- Mattamuskeet. Medium, yellow and red; brisk sub-acid. Winter. Good keeper. N. C.
- Maverack's Sweet, p. 319.
- Maxey. Full medium, striped; sub-acid, good, rather dry. Long keeper. Ky.
- Maxfield. See Mangum.
- May, or May Apple of Virginia, p. 306.
- McAfee's Nonsuch. Large, roundish-oblate, striped; pleasant sub-acid. Early winter. Ky. Valued in many localities.
- McCoy's Pippin. Large, oblate, greenish-white; pleasant sub-acid, good. Autumn. Pa.
- McDowell's Sweet. Medium, roundish-oblate, striped; sweet, very good. Autumn. N. C.
- McHenry. Resembles American Summer Pearmain—keeps till winter. Growth free.
- McIntosh Red. Full medium, roundish, bright crimson on light yellow skin; heavy bloom, flesh white, stained with light red, tender, juicy, sub-acid. Early winter. Very hardy. Ontario.
- McKinley. Large, dull red, showy; good, sub-acid. Early winter. Mo.
- McLellan, p. 329.
- McMahan's. White, large, roundish-obovate, yellowish-white; a good cooking apple. Wis.
- Meach. Large, roundish, striped, light red; rich, mild sub-acid, aromatic. Autumn. Vt.
- Meigs. See Red Winter Pearmain.
- Mellinger. Medium, roundish-conical, red striped; good. Winter.
- Melon, p. 312.
- Melt-in-the-mouth, p. 312.
- Melvin Sweet. Medium, roundish, striped pale red; rich. December. Mass.
- Menagere. Very large, flat, pale yellow—cooking. German.
- Merritt's Sweet. Medium, oblate, yellow; very sweet—good bearer. August and September.
- Methodist. Medium, oblong oval, greenish, striped; mild sub-acid, not rich. November. Conn.
- Mexico, p. 313.
- Michael Henry Pippin, p. 342.
- Michigan Golden Pippin. See Lowell.
- Mickel, p. 330.
- Miffin King. Small, oblong oval, dull red; very good. Autumn. Pa.
- Milam, p. 330.
- Milden. (Milding.) Large, oblate, yellow and red; good. Early winter.
- Millcreek. See Smokehouse.
- Millcreek Vandevere. See Smokehouse.
- Miller Apple. Large, ovate, striped; mild sub-acid, rich. Autumn. N. Y. [Another Miller Apple, in Pa., is rather small, striped, with white flesh. October.]
- Miller's Best Sort. See Progress.

- Minister, p. 330.
- Minkler. Medium, conic, red; acid, good, long keeper. Ill. New.
- Minnesota, p. 349.
- Missouri Pippin. Above medium, roundish-oblate, striped with red on pale yellow skin; crisp, breaking, sub-acid, good; keeps through winter.
- Molasses. There are several of this name, all medium in size, striped, and sweet.
- Monarch. Medium, roundish-oblate, striped; sub-acid. Autumn.
- Monk's Favorite, p. 330.
- Monmouth Pippin, p. 342.
- Monstrous Pippin, p. 342.
- Montreal. See St. Lawrence.
- Montreal Beauty Crab, p. 349.
- Moore's Extra. Above medium, striped, fine grained, mild sub-acid, very good. Winter. Ohio.
- Moore's Greening. Medium, round, greenish-yellow; brisk acid, good. Productive. Winter. Conn.
- Moore's Sweeting. Medium, oblate, deep red; sweet, dry—good keeper.
- Moose, or Mouse. Large, roundish-oblong, greenish; flesh yellow, fine grained, light, delicate. N. Y.
- Morrison's Red. Medium, conic, light yellow and red; mild, pleasant. Winter. Mass.
- Moses Wood. Medium, roundish, yellow and red; tender, juicy, pleasant, sub-acid. September. Vigorous, productive.
- Mote's Sweet. Large, roundish, light yellow; rich sweet, very good. Autumn. Ohio.
- Mother, p. 330.
- Mountain Pippin. See Fallawater.
- Mrs. Bryan. Large, orange red; good. Autumn. Ga.
- Munson Sweet, p. 307.
- Murphy, or Murphy's Red. Large, roundish-oblong, striped; tender, agreeable. Early winter. Mass.
- Murray. Medium, oblong, conic, rich orange yellow; brisk sub-acid. Winter. Southern.
- Muskmelon. See Toccoa.
- Musk Spice. See Fall Wine.
- Myer's, p. 313.
- Mygatt's Bergamot. See Dyer.
- Naigle's Winter. Medium, yellow and red; crisp, juicy, sub-acid, very good. Productive. Early winter. Mo.
- Nantahalee. Medium, oblate, conic, pale green; sprightly and good. Summer. Ala.
- Nansemond. (Nansemond Beauty.) Medium, roundish-oblate, red streaked; good. Winter.
- Ned. Medium, striped; pleasant sub-acid, very good. Early winter. Pa.
- Ne Plus Ultra of Georgia. See Buckingham.
- Nequassa. Large, oblate, striped; flesh white, very sweet. December. N. C.
- Neverfail. See Ralle's Jannet.
- Neversink. Large, roundish, red on yellow; very good—pineapple flavor. Winter. Pa.
- Newark King, p. 331.

- Newark Pippin, p. 342.
- Newark Sweeting. See Campfield.
- New England Seek-no-further. See Westfield ditto.
- New Jersey Red Streak. See Early Pennock.
- Newtown Greening. See Golden Pippin of Westchester County.
- Newtown Pippin, p. 342.
- Newtown Spitzenburgh. See New York Vandevere.
- New York Greening. See Golden Pippin of Westchester County.
- New York Pippin. See Ben Davis.
- New York Spice. See Leland Spice.
- New York Vandevere, p. 331.
- Nickajack, p. 331.
- Nix Green. Medium, oblate, greenish-yellow; sub-acid, good. Early winter. Ga.
- Nixonite (Ozark Mammoth). Large, round oblate, yellow, flesh coarse, acid; good keeper. Mo.
- Nodhead. See Jewett's Red.
- Nonpareil, or Old Nonpareil. Rather small, roundish ovate, greenish-yellow; rich, acid. December. English—of little value here.
- Nonsuch. See Red Canada.
- Norfolk Beaufin. Large, oblate, dull red; flesh firm, poor—cooking. Good keeper. English.
- Northampton. Medium, oblate, red streaked; good. Early winter.
- North Carolina Greening. See Bullet.
- Northern Golden Sweet. See Northern Sweet.
- Northern Spy, p. 331.
- Northern Sweet. Medium, roundish-conic, yellow; sweet, rich, very good. Autumn. Vermont.
- Northwestern Greening, p. 343.
- Norton's Melon. See Melon.
- Nottingham Brown. See Brown.
- Oakland. (Oakland County Seek-no-further.) Medium, roundish-oblate, yellow and red; good. Winter.
- Oconee Greening. Very large, roundish-oblate, yellow; lively sub-acid, aromatic, very good. Resembles Disharoon. Winter. Ga.
- Oglesby. Medium, oblate, yellow; crisp, sub-acid, good. Va.
- Ohio Favorite. See Ortleby.
- Ohio Nonpareil. See Myer's.
- Ohio Pippin. See Ernst's Pippin.
- Ohio Red Streak. Medium, oblate, striped; compact, rich, sub-acid. Winter. Ohio.
- Ohio Wine. See Fall Wine.
- Oldenburgh, p. 313.
- Old English Codlin. Rather large, oblong conic, yellow; sub-acid—cooking. Summer and autumn. English.
- Oldfield. Medium, oblate conic, yellow; mild sub-acid, pleasant. Winter. Conn.
- Old Nonsuch. See Red Canada.
- Old Town Crab, or Spice Apple of Va. Rather small, greenish-yellow; crisp, sweet, pleasant, aromatic. Winter.
- Old Town Pippin. See Hubbardston Nonsuch.

- Oliver, p. 318.
- Orange Crab, p. 349.
- Orange Pippin. Medium, roundish, whitish-yellow; fine-grained, mild sub-acid, good. Early autumn. N. J.
- Orange Sweet. Several of this name.
- Orndorf, p. 313.
- Orne's Early. Rather large, pale yellow. September. Foreign.
- Ortley, p. 343.
- Osborn's Sweet. Large, roundish, yellow; sweet. October. Western.
- Osceola, p. 331.
- Osgood's Favorite. See Lyscon.
- Oslin. Rather small, oblate, yellow; firm, rich, aromatic. August. Scotch.
- Ostrokoff. Medium, round, yellow, cavity deep, stem medium, basin shallow, ribbed; flesh greenish, acid. Good for cooking purposes. Early winter. Russian.
- Otoe Red. (Otoe Red Streak.) Medium, roundish-oblate, yellow and red; good. Winter.
- Overman's Sweet. Medium, conic, striped; sweet, very good—baking. October. Ill.
- Ox Apple. See Monstrous Pippin.
- Ox Eye. See N. Y. Vandevere.
- Ozark. See Gano.
- Paradise, Summer Sweet, p. 257.
- Paradise, Winter Sweet, p. 272.
- Paragon. Large, roundish-conical, smooth yellow, washed red, cavity large, regular, deep, basin furrowed, stem short, slender, but yellow, crisp, juicy, good. Winter. Tenn. Said by some to be identical with Arkansas Black Twig.
- Park Spice, or Park Apple. Medium, roundish, striped; mild sub-acid, aromatic, very good. Winter. Productive. Westchester County, N. Y.
- Patterson Sweet. See Bailey Sweet.
- Paul's Imperial Crab, p. 349.
- Pawpaw. Medium, striped; mild, sub-acid. Mich.
- Payne's Hesper. Medium, roundish oblate, nearly sweet. Keep well. Mo.
- Peach of Montreal. Resembles Porter, but with a bright red cheek. Very productive and hardy. September.
- Peach Pond Sweet. Medium, oblate, striped light red; tender, sweet, agreeable. Autumn. N. Y.
- Pearsall's Sweet. Large, light red, shaded and striped; coarse, sweet, good. Early winter. Productive, good for baking. Long Island.
- Peck's Pleasant, p. 343.
- Pennock's Red Winter. Large, roundish, slightly oblong, deep dull red; rather coarse, mild, pleasant. Affected with bitter rot. Good keeper. Pa.
- Pennsylvania Vandevere. See Vandevere.
- People's Choice. Medium, oblate, bright red; brisk sub-acid. Winter. Pa.
- Pepka. See Sweet Pepka.
- Perry, p. 332.
- Petersburgh Pippin. See Newtown Pippin.

- Pewaukee, p. 332.
- Philadelphia Sweet. See Autumn Sweet Bough.
- Philippi. Large, oblate conical, greenish-yellow; tender, fragrant, very good. January. Pa.
- Phillips' Sweet, p. 319.
- Picard. (Picard's Reserve.) Medium, roundish-oblate, red and yellow. Winter.
- Pickman Pippin. Medium, roundish-oblate, yellow; acid—cooking. Winter. Mass.
- Pilot, p. 322.
- Pine Apple Russet. Medium, conic, whitish-yellow; sub-acid—of little value. Autumn.
- Pink Sweet. Small, greenish and bright red; rich, pleasant, sweet. Great bearer. September, October. Pa.
- Pittsburgh Pippin, p. 343. See also Switzer.
- Pittstown. Rather large, roundish, slightly oblong, light yellow, with a brown blush; tender, mild, sub-acid, good. October. Pittstown, N. Y.
- Pleasant Valley. (Pleasant Valley Pippin.) Medium, roundish-oblate, greenish-yellow; good. Winter.
- Plumb's Cider. Medium, roundish, greenish-yellow with some stripes, juicy, mild sub-acid. Autumn. Wis.
- Polhemus of Long Island. See Moore's Sweet.
- Polly Bright. Oblong conic, light yellow, with a red cheek; tender, pleasant. September, October. Va. and West.
- Pomeroy. Medium, regular, ovate; shaded and striped red. Flesh whitish, crisp, sweet. Winter. N. Y.
- Pomme d'Api. See Lady Apple.
- Pomme de Neige. See Fameuse.
- Pomme Grise, p. 343.
- Pomme Royal. See Dyer.
- Porter, p. 317.
- Potter Sweet. See Leicester Sweet.
- Poughkeepsie Russet. See English Russet.
- Pound Royal, p. 343.
- Pound Sweet. See Lyman's Pumpkin Sweet. Several others of the name.
- Pownal Spitzenburgh. Rather large, oblate, slightly conic, striped; sub-acid. Winter.
- Premium. Medium, roundish-conical, yellow; good. Winter.
- President. Large, roundish; yellow, with red on sunny side, slightly sprinkled with gray dots.
- Pres. Ewing. Medium, roundish, striped; firm, agreeable, sub-acid. Winter. Ky.
- Pride of September. See September.
- Priestley. Medium, roundish oblong, striped dull red; spicy, good. Winter. Pa.
- Priest's Sweet. Medium, roundish conic, striped dull red; tender, pleasant. Good keeper. Mass.
- Primate, p. 304.
- Princely. Rather large, roundish-oblate, striped; sub-acid, fine. Autumn. N. J. and Pa.
- Prince's Harvest. See Early Harvest.

- Progress, p. 344.
- Prolific Sweet, p. 307.
- Prother's Winter. Medium, conical, yellow and red. Late winter.
- Pryor's Pearmain. See Pryor's Red.
- Pryor's Red, p. 332.
- Pumpkin Russet, p. 307.
- Pumpkin Sweet, p. 307. There are several varieties under the name Pumpkin Sweet.
- Putnam Harvey. Medium, roundish-oblate, pale green; tender, sub-acid, agreeable. August and September.
- Putnam Russet. See Roxbury Russet.
- Pyle's Red Winter. Large, roundish, greenish-yellow shaded with pale red; crisp, juicy, pleasant, very good. Winter. Pa.
- Quaker Beauty Crab, p. 349.
- Queen Anne. See Lowell.
- Queen's Choice Crab, p. 350.
- Quince. Rather large, roundish-oblate, yellow; mild, sub-acid, aromatic. November.
- Ragan, p. 332.
- Rainbow. Large, conical, yellow, striped with red; flesh yellow, solid, juicy, sub-acid. West.
- Rambo, p. 313.
- Rambour d'Eté, or Summer Rambour. Medium, flat, striped; sub-acid. September. French.
- Rambour Queen, p. 333.
- Ramsdell's Sweet, p. 319.
- Randel's Best. Medium, roundish, striped; sweet. December.
- Raspberry, p. 302.
- Rall's Jannet, p. 333.
- Rawle's Jannet. See Rall's Jannet.
- Ray Apple. See Munson's Sweet.
- Rebecca. Large, roundish-oblate, whitish-yellow and crimson; tender, pleasant, spicy. August, September. Del.
- Recumbent, p. 333.
- Red and Green Sweet. Large oblong conic, ribbed, striped; quality moderate—baking. End of summer.
- Red Astrachan, p. 304.
- Red Bellflower. Large, oblong conic, striped; mild, sub-acid, becoming mealy. Worthless. French.
- Red Bietigheimer. See Bietigheimer.
- Red Calville, or Red Winter Calville. Medium, roundish-conic, ribbed, red; mild, sub-acid. Winter. Foreign.
- Red Canada, p. 333.
- Red Cat-head. Large, roundish-conic, yellow, shaded red, brisk, pleasant. Autumn. Va.
- Red Cheek. See Fall Orange, also Raspberry. Several others of the name.
- Red-Cheeked Pippin. See Monmouth Pippin.
- Red Detroit. See Detroit.
- Red Doctor. See Doctor.
- Red Everlasting. See Simmon's Red.
- Red Fall Pippin. See Red Winter Pearmain.
- Red Gilliflower. See Cornish Gilliflower.

- Red Hazel. See Nickajack.
- Red Ingestrie. Small, ovate, yellow and red; firm, rich. Autumn. English. Of little value here.
- Red June. See Carolina Red June.
- Red Juneating. See Early Strawberry.
- Red Lady Finger. See Red Winter Pearmain.
- Red Pearmain. See Kaighn's Spitzenburgh.
- Red Pumpkin Sweet. See Ramsdell's Sweet.
- Red Quarrenden. See Devonshire Quarrenden.
- Red Queen, p. 344.
- Red Rance. Medium, roundish-oblate, red striped; good. Winter.
- Red Republican. Large, roundish-oblate, striped; coarse; sub-acid. Autumn. Pa.
- Red Romanite. See Carthouse.
- Red Russet, p. 344.
- Red Seek-no-further. See Keiser.
- Red Siberian Crab, p. 350.
- Red Spitzenburgh. See Richards' Graft.
- Red Streak. Medium, roundish, streaked; rich, firm, dry—for cider. English.
- Red Stripe. Rather large, oblong, conical, striped; mild, sub-acid, very good. Late summer. Ind.
- Red Summer Calville, p. 313.
- Red Sweet. Medium, roundish-oval, striped; tender, sweet, very good. December. Ohio.
- Red Vandevere. See Red Winter Pearmain.
- Red Warrior. See Yates.
- Red Winter Pearmain, p. 333.
- Red Winter Sweet. Medium, roundish, striped deep red; coarse, rich, very sweet. Early winter. Va. and Ky.
- Reinette Blanche d'Espagne. See White Spanish Reinette.
- Reinette de Canada. See Canada Reinette.
- Republican Pippin, p. 313.
- Rhode Island Greening, p. 344.
- R. I. Seek-no-further. See Long Island Seek-no-further.
- Rhode's Orange. Medium, roundish-oblate, yellow and red. Summer.
- Ribston Pippin, p. 313.
- Richards' Graft, p. 314.
- Richfield Nonsuch. See Red Canada.
- Richland Sweet Crab, p. 350.
- Richmond, p. 306.
- Ridge Pippin. Large, roundish-conic, yellow; mild, aromatic. Spring.
- Riest. Large, roundish, yellow; pleasant, very good. August. Pa.
- Ritter. Medium, roundish-oblong, striped, good. Autumn. Pa.
- River. Rather large, oblong ovate, striped; coarse, pleasant, sub-acid. Autumn. Mass.
- Roadstown Pippin. Large, oblate, greenish-yellow; sprightly sub-acid—market and cooking. N. J.
- Roberson's White, p. 318.
- Robey's Seedling, p. 333.
- Robinson. Rather small, roundish-conical, greenish-yellow; very mild sub-acid, good. Winter. Iowa.

- Rock Apple. Large, roundish, striped; sub-acid, very good. Autumn. N. H.
- Rockingham Red. See Allum.
- Rockremain. See Ralle's Jannet.
- Rockport Sweet. Medium, oblate, yellow, with a red cheek; sweet, aromatic. Winter. Mass.
- Rock Sweet. Rather small, roundish, oblate conic, striped; sweet, rich. September. Mass.
- Romanite. See Carthouse.
- Romanite of New Jersey. See Rambo.
- Roman Stem, p. 344.
- Rome Beauty, p. 333.
- Romna, p. 345.
- Roseau. Large, irregular, dark red; of little value. Foreign.
- Rosenhager, p. 345.
- Rose Red. Medium, oblate, striped and shaded red; lively sub-acid, very good. Autumn. Western N. Y.
- Ross Nonpareil. Small, roundish, thin russet; rich sub-acid, aromatic. October. Irish. Of little value.
- Rosy Red. Medium, striped; mild sub-acid. Early winter. Michigan.
- Roxbury Russet, p. 345.
- Royal Pearmain. See Herefordshire Pearmain.
- Royal Pippin. See Carter.
- Royal Table, p. 333.
- Rum Apple. Medium, oblate, yellow, shaded crimson; sub-acid. Winter. N. H.
- Runnels. Medium, green, rough; flesh firm, very good. Late keeper—market.
- Russet Pearmain, p. 334.
- Rymer. Large, oblate conic, yellow, shaded crimson; sub-acid. December. Foreign.
- Sailly Autumn. Medium, oblate conic, greenish-yellow, with a reddish cheek; tender, rich, aromatic. September. N. Y.
- Saint Lawrence, p. 314.
- Salome. Medium, roundish, slightly conical, striped and shaded light and deep red on a pale yellow skin; flesh tender, mild sub-acid, slightly aromatic, very good. Long keeper. A valuable new western apple.
- Sandy Glass, p. 345.
- Sapson. See Sops-of-Wine.
- Sarah. Large, oblate, red striped; good. Autumn.
- Sassafras Sweet. See Haskell's Sweet.
- Saxton, or Fall Stripe. Bright red, sub-acid, crisp, pleasant. September.
- Scarlet Nonpareil. Medium, roundish-conic, striped; sub-acid. November. English.
- Scarlet Pearmain. Medium, ovate conic, crimson; flesh white, good. Autumn. English.
- Scarlet Perfume. See Cole.
- Schoonmaker. Large, roundish-oblate, greenish-yellow; brisk sub-acid, good. Winter.
- Scollop Gilliflower. Rather large, roundish-conic, much ribbed, striped, firm. December. Ohio.
- Scott's Winter. Medium, round, deep red, rather acid, good. Is very hardy and a long

- keeper, and a good substitute at the North for Roxbury Russet.
- Seager. Large, roundish-conic, red striped; good.
- Seago. See Mangum.
- Seek-no-further. See Green do. and Westfield do.
- Seever's Red Streak. Medium, roundish, striped, sub-acid. Autumn. Ohio.
- Selma. Rather large, roundish-oblate, yellow, russet, and dull red; mild sub-acid, good. December. Ohio.
- Senator. See Oliver.
- September. Large, roundish, yellow; agreeable sub-acid. October. Pa.
- Settle Pippin. Medium, white shaded light red; flesh white, crisp, juicy, pleasant. Autumn. Va.
- Shackleford. Large, roundish, oblate, red; flesh yellow, mild sub-acid. Said to be hardy and free grower. West. Winter.
- Shakers' Yellow. See Early Pennock.
- Shannon. See Ohio Pippin.
- Sharpe's Early. See Summer Queen.
- Sharp's Spice. See Fall Wine.
- Sheep Nose. See Bullock's Pippin. Other sorts of the name.
- Sheppard's Sweet. Medium, ovate, ribbed, striped; sweet, pleasant. Autumn. Conn.
- Sherwood's Favorite. See Chencango Strawberry.
- Shiawasse Beauty, p. 314.
- Shippen's Russet. Large, roundish-oblate; spongy, acid. Winter.
- Shirley. See Foundling.
- Shockley, p. 334.
- Siloam, p. 334.
- Simmon's Red. Medium, oblate, yellow with red blush; flesh yellow, good. Tree vigorous; profuse bearer. Summer. Ala.
- Sinclair's Yellow. See Early Harvest.
- Sine Qua Non, p. 305.
- Skrishapfel, p. 334.
- Slingerland Pippin. Rather large, conic oblate, yellow, shaded red; rich sub-acid. Early winter. N. Y.
- Small, roundish-conical, yellow russeted; good. Autumn.
- Small Romanite. See Carthouse.
- Smalley, or Spice. Medium, oblate conic, yellow; brisk, aromatic. Autumn. Conn.
- Smithfield Spice. See Dyer.
- Smith's Cider, p. 334.
- Smokehouse, p. 314.
- Snow. See Fameuse.
- Snyder, p. 350.
- Sol. Carter. See Equinately.
- Somerset. Large, roundish, yellow and red; tender, juicy, sub-acid. September.
- Somerset of New York.
- Snyder Crab, p. 350.
- Sonoma. Large, irregular, yellow striped with red. Winter. Cal.
- Sops-of-Wine, p. 302.
- Soulard, p. 314.
- Sour Bough. See Summer Pippin.
- Southern Porter. Medium, ovate, bright yellow, rich sub-acid. Ripens several weeks after Porter, or in September in California.

- Southern Striped June. See Early Red Margaret.
- Spanish Reinette. See White Spanish Reinette.
- Spencer Sweet. See Hartford Sweet.
- Spice Apple of Virginia. See Old Town Crab.
- Spice Russet. Small, round oblate, yellow russet; aromatic, good. Winter.
- Spice Sweeting, or Berry Bough. Medium, oblate, smooth, pale yellow; sweet, aromatic; often knotty. August.
- Spitzenburgh, p. 334. Several of this name.
- Sponge. Large, roundish, striped red on light green; rather acid. December.
- Sprague. Rather small, oblong ovate, yellow, sub-acid. October.
- Springport Pippin. Medium, roundish, yellowish-green; sub-acid, very good. Winter. Cayuga County, N. Y.
- St. Lawrence, p. 314.
- Stanard. Large, roundish, yellow and red; rather coarse, sub-acid. December. Erie County, N. Y.
- Star, p. 318.
- Stark. Large, striped, coarse; mild sub-acid, good. Valuable as a keeper. Ohio.
- Starkey. Medium, roundish-oblate, nearly all rich red, mild sub-acid, very good. Early winter. Me.
- Starr, p. 305.
- Steele's Red Winter. See Baldwin—also Red Canada.
- Steel's Sweet. Medium, round, ribbed, yellow. Winter. Conn.
- Stensill. Rather large, oblate, striped; sub-acid. January. Early bearer. N. C.
- Sterling Beauty. See American Beauty.
- Stevenson's. Medium, green, russeted; flesh firm, juicy. Winter. Ark.
- Stevenson's Winter, p. 318.
- Stillman's Early. Small, roundish-conic, yellow; tender, pleasant, sub-acid. July and August. Oneida County, N. Y.
- Stillwater Sweet. Medium, greenish-yellow, tender, sweet, very good. Autumn. Ohio.
- Straat. See Stroat.
- Strawberry. See Late Strawberry and Chenango Strawberry.
- Streintown, p. 345.
- Striped Ashmore. See Ashmore.
- Striped Belle Fleur. See Red Bellflower.
- Striped Gilliflower. Roundish-conical, striped bright red on white skin, brisk sub-acid. Tree a vigorous grower. Winter.
- Striped Harvest. See Harvest Red Streak.
- Striped June. See Early Red Margaret.
- Striped Pearmain, or Striped Winter Pearmain. See Mc-Afee's Nonsuch.
- Striped Sweet Pippin. Rather large, roundish, striped rich red on bright yellow; very mild sub-acid, very good. Early winter.
- Stroat. Medium, roundish,

- ovate, yellowish-green; rich; very good. Autumn. N. Y.
- Stump, p. 307.
- Sturmer Pippin. Small, oblate, yellow and red; rich, sub-acid. Winter. Ky.
- Sudlow's Fall Pippin. See Franklin Golden Pippin.
- Sugar Loaf Pippin. Medium, oblong conic, smooth, whitish-yellow; sub-acid, poor. Summer. English.
- Sugar Sweet. Large, conic, ribbed, yellow, shaded red; rich, very sweet. Winter. Mass.
- Summer Bellflower. Medium, ovate, yellow; flesh white, rich, sub-acid, very good. August. Dutchess County, N. Y.
- Summer Golden Pippin. Small, ovate, yellow; rich. August. English.
- Summer Hagloe, p. 303.
- Summer Horse. See Horse.
- Summer King. Medium, oblate; yellow, red blush; good.
- Summerour. See Nickajack.
- Summer Pearmain. See Autumn Pearmain.
- Summer Pippin, p. 305.
- Summer Pound Royal. Large, roundish-conic, greenish-white; fine-grained, tender, sub-acid, very good. End of summer. Profitable. Grown in Ohio and Mich.
- Summer Queen, p. 303.
- Summer Rambo. (A corruption of Summer Rambour.) See Western Beauty.
- Summer Rambour. See Rambour d'Eté.
- Summer Rose, p. 303.
- Summer Seek-no-further. Medium, oblate conical, yellow; very good.
- Summer Sweet of Ohio. See High-top.
- Summer Sweet Paradise, p. 307.
- Superb Sweet. Large, roundish, yellow and red; tender, rich, sweet. Autumn. Mass.
- Surprise. Small, roundish, yellow; flesh red. Of little value.
- Susan's Spice. Medium, oblate, yellow and red. Autumn.
- Sutton Beauty, p. 334.
- Sutton's Early. Medium, slightly conic, light yellow; tender, juicy, rich sub-acid. September. Nova Scotia.
- Swaar, p. 345.
- Sweet and Sour. Rather large, with green acid ribs, and yellow insipid hollows between them—a curiosity only.
- Sweet Baldwin. Medium roundish, deep red; firm, sweet—of little value. November.
- Sweet Belle et Bonne. Medium, roundish-oblate, yellow russeted; good. Early winter.
- Sweet Borovinka, p. 298.
- Sweet Bough, p. 299.
- Sweet Fall Pippin. Large, oblate, greenish-yellow; sweet, rich. October, November. N. Y.
- Sweet Golden Pippin. See Autumnal Swaar.
- Sweet Golden Russet. Rather large, conical, yellow, russeted; rich, sweet. September, October. Hardy, productive.
- Sweet Harvest. See Sweet Bough.

Sweet Harvey. See Sweet Vandevere.

Sweet June. See High-Top.

Sweet Longfield, p. 307.

Sweet Nonsuch. See Sweet Romanite.

Sweet Pear. Medium, roundish-conical, yellow. Autumn.

Sweet Pearmain, p. 320.

Sweet Pepka, p. 308.

Sweet Pippin. See Hog Island Sweet; also Moore's Sweet.

Sweet Rambo. Medium, roundish-oblate, yellow, shaded red with large dots; tender, juicy, rich, aromatic. Late autumn. Pa.

Sweet Red Streak. See Sweet Vandevere.

Sweet Romanite, p. 320.

Sweet Russet. See Pumpkin Russet.

Sweet Russet Crab, p. 350.

Sweet Swaar. See Autumnal Swaar.

Sweet Vandevere, p. 320.

Sweet Wine. See Fall Wine.

Sweet Wine Sap. Medium, oblate, splashed deep crimson; tender, juicy, sweet, rich. November. Pa.

Swiss, or Switzer, p. 303.

Switzer, p. 303.

Sylvan Sweet Crab, p. 350.

Tallman Sweeting, p. 271.

Tallow Pippin. See Lowell.

Tart Bough. See Early Harvest.

This name is also applied to two other sorts, one of which resembles Early Harvest, but is later, more acid, and the tree of more rapid growth; the other is a small, whitish,

roundish, conical apple, with a pleasant sub-acid flavor; ripening in August.

Taunton. Large, oblate conic, greenish-yellow and striped; aromatic, acid, good. Autumn. Southern.

Tenderskin. Small, yellow, and striped; tender, pleasant, sub-acid, very good. Early winter. Southern.

Terral's Late. Large, striped; sub-acid, good. Autumn. Great bearer. Southern.

Terry. Medium, oblate, dark red; flesh yellow, crisp, sub-acid. Good keeper. Winter. Ga.

Tetofsky, p. 304.

Tewksbury Blush, p. 345.

Tibbett's Seedling. Large, conic, whitish; sub-acid, pleasant. Michigan.

Tift Sweet, p. 308.

Tillaquah. Medium, roundish-oblate, yellow with red stripes. Winter.

Tinmouth, or Teignmouth. Rather large, oblate, whitish-yellow, shaded red; mild sub-acid. Early winter. Very hardy. Vt.

Titovca. Large, striped with bright red on a greenish-yellow skin; coarse, sub-acid, good. Late summer. Russian.

Titus, p. 314.

Titus Pippin. Large, oblong conic, light yellow; not high flavored. December.

Toccoa. Rather large, conic, irregular striped; with a rich Spitzenburgh flavor. August. Ga.

Tolman's Sweet, p. 321.

- Tompkins. See Dyer.
- Tompkins County King. See King.
- Toole's Indian Rareripec. Large, roundish, light yellow, reddish cheek; sub-acid, good—culinary. Early autumn.
- Townsend. See Hocking.
- Transcendent Crab, p. 350.
- Transparent Zoar. Large, roundish, regular, white with a carmine blush, flesh tender, mild sub-acid. Late Autumn. Ohio.
- Trenton Early, p. 305.
- Trumbull Sweeting. Rather large, round oblate, yellow; sweet, good. Autumn. Ohio.
- Tuft's, or Tuft's Baldwin. Large, red on yellow ground, handsome; flesh dry, with a moderately good, sub-acid flavor. Autumn. Mass.
- Tulpahocken. See Fallawater.
- Turkey Greening. Large, oblate, green with a dull blush; flesh greenish, sub-acid, not rich. Winter. Conn.
- Turner's Green. See Winter Cheese.
- Tuscaloosa Seedling. Medium, yellow, almost covered with dark red; flesh yellow, tender, good. A good keeper. Ala.
- Tuttle, of Conn. Large, roundish, regular, striped dark red; pleasant sub-acid, good.
- Twenty Ounce, p. 314.
- Twitchell's Sweet. Medium, conic, red and purple; flesh white, stained; sweet, pleasant flavor. November. N. H.
- Uncle Sam's Best. See Fall Wine.
- Utter. Rather large, oblate, striped with red on a yellow skin; pleasant sub-acid, good in quality. Early winter. A hardy, popular, Wisconsin apple.
- Vandevere, p. 314.
- Vandyne. Large, roundish, yellow; sub-acid, agreeable. October.
- Van Wyck Crab, p. 350.
- Vasili's Largest. See Basil the Great.
- Vaughan's Winter. Medium, oblate oblique, whitish-yellow, shaded red; agreeable. Winter. Ky.
- Vermont. See Walworth.
- Vermont Pippin. See Timmouth.
- Victoria Red. See Ben Davis.
- Victorious Reinette. Large, roundish, oblong, pale yellow; pleasant, aromatic. Winter. German.
- Victuals and Drink. Large, oblong, dull yellow; rich, sweet, very good. Early winter and later. N. J.
- Vine Apple. Medium, oblong conical, golden yellow; flesh yellow, sub-acid. Fall. Va.
- Virginia Greening, p. 345.
- Vorontsh Rosy. Large, roundish-conic; yellow, striped red; flesh yellow, sub-acid. Midwinter. Russian.
- Wabash Bellflower. Large, ovate, orange red on yellow; sub-acid, good—handsome. November. Pa.
- Waddel's Hall. See Shockley.

- Wagener, p. 335.
- Walbridge, p. 326. Late winter. Very hardy. Ill.
- Walker's Yellow. Large, conic, golden yellow; rather acid. Winter. Pa.
- Wallace Howard. Large, conical; orange red, with crimson stripes; flesh crisp, nearly sweet. Fall. Ga.
- Walpole. Medium, roundish, striped; sub-acid. Late summer. Mass.
- Walworth. See Summer Pippin.
- Warfield, p. 306.
- Warren Pennock. See Early Pennock.
- Warren Pippin. See Ortley.
- Washington. See Sops-of-Wine.
- Washington Royal. Rather large, round oblate, yellowish-green; fine flavored—keeps till July. Mass.
- Washington Strawberry, p. 314.
- Water. Medium, ovate, whitish-yellow with crimson cheek; pleasant sub-acid, very good. Autumn and winter. Handsome and valuable. Pa.
- Watermelon. See Melon.
- Watson's Dumpling. Large, roundish, red on yellowish-green; sub-acid—cooking. Late autumn. English.
- Watson's Favorite. Medium, roundish-oblate, red on yellow; pleasant, rich, juicy, very good.
- Watson's Vandevere. See Vandevere.
- Wattaugah. See Hoover.
- Waxed of Core. Medium, roundish-oblate, pale yellow; mild sub-acid. November. Va.
- Wealthy, p. 318.
- Webb's Winter. Medium, round, yellow.
- Wellford's Yellow, p. 335.
- Wellington Apple. See Dume-low's Seedling.
- Wells' Apple. Medium, roundish-oblate, red on yellow; sub-acid. Tree vigorous, stems slender, prolific. Good keeper. Origin Pa., but disseminated from Ohio. See Dominie.
- Wells' Sweet, p. 322.
- Westchester Seek-no-further. See Long Island Seek-no-further.
- Western Beauty. Large, roundish, shaded with bright red on pale yellow; coarse, crisp, tender, mild sub-acid. Early winter. Ohio.
- Western Baldwin. See Babbitt.
- Western Spy, p. 346.
- Westfield Seek-no-further, p. 335.
- Weston. Medium, roundish-conical, striped on light yellow; mild, pleasant. October. Mass.
- Wetherell's White Sweeting. Large, yellow. September. N. J.
- Wheeler's Sweet. Large, conical, ribbed, yellow, with a red cheek; sweet, pleasant. October. Ohio.
- White Astrachan. Medium, roundish, very smooth; tender, delicate, rather dry. August. Russian. Of little value.
- White Bellflower. See Ortley.
- White Detroit. See Ortley.
- White Doctor. Large, roundish-oblate, greenish-yellow; acid, not rich. Autumn. Pa.

- White Golden Sweet. See Baker's Sweet.
- White Hawthornden. See Hawthornden.
- White Juneating, p. 305.
- White Paradise. Medium, roundish-oblate; yellow, streaked red. Good. Winter.
- White Pippin, p. 346.
- White Rambo, p. 346.
- White Seek-no-further. See Green do.
- White Spanish Reinette, p. 346.
- White Spice. See Dyer.
- White Sweet. Medium, roundish-oblate, white with a red cheek; very sweet—culinary. Autumn. Great bearer. Me.
- White Vandevere. See Vandevere.
- Whitewater Sweet. Medium, round, yellow; sweet—long keeper. Southern Ohio.
- White Winter. Small, round, light yellow, with a red cheek; juicy, mild, sub-acid, not rich. Spring. Pa.
- White Winter Calville. Medium, roundish-conic, ribbed, yellow; coarse, pleasant. December. French. Valueless here.
- White Winter Pearmain, p. 346.
- Whitney's Crab, p. 350.
- Whitney's Russet. Medium, oblate, russeted; flesh fine-grained, rich, spicy. Winter. Canada.
- William Penn. Rather large, round oblate, grayish stripes on greenish-yellow; juicy, rich, aromatic, very good. February. Pa.
- William Tell. See Pittsburgh Pippin.
- Williams' Early Red. See Williams' Favorite.
- Williams' Favorite, p. 303.
- Williams' Red. See Williams' Favorite.
- Willis Sweet. Rather large, roundish, light yellow with some red; sweet, rich, very good—productive. Early autumn. L. I.
- Willow Twig, p. 335.
- Windsor, p. 335.
- Windsor Chief. See Windsor.
- Wine, p. 335.
- Wine of Conn. See Twenty Ounce.
- Winesap, p. 336.
- Wine Strawberry. See Richard's Graft.
- Wing Sweet, p. 320.
- Winn's Russet. Large dark russet, striped; sub-acid. Good keeper. Me.
- Winslow. Large, round, striped; sub-acid. November and December. Va.
- Winter Aport, p. 336.
- Winter Cheese, p. 346.
- Winter Genneting. See Rawle's Jannet.
- Winter Harvey. Large, roundish-conic, pale yellow.
- Winter King. See King of Tompkins County.
- Winter Pear, p. 315.
- Winter Pearmain. See Autumn Pearmain. Some other sorts of the name.
- Winter Pippin of Geneva, p. 346.
- Winter Pippin of Vermont. Large, round, yellow with red cheek; tender, agreeable. Winter.

- Winter Queen. Medium, conic, crimson; mild sub-acid. Early winter.
 Winter Queen. See Fall Queen of Kentucky.
 Winter. Seek-no-further. See Fall do. Winter Strawberry. Above medium, roundish, juicy, with peculiar aromatic sub-acid flavor. Montreal.
 Winter Sweet Paradise, p. 322.
 Winter Wine. See Wine.
 Winthrop Greening, p. 318.
 Winthrop Pearmain. Large, round ovate, striped; spicy, pleasant. Autumn. Me.
 Wolf River, p. 336.
 Wolf's Den. See Averill.
 Wolman's Harvest. See Summer Rose.
 Wood's Greening, p. 346.
 Wood's Sweet. Large, oblate, irregular, striped; tender, juicy, rich; very good. Autumn. Vt.
 Woodstock. See Dyer.
 Woodstock Pippin. See Blenheim Pippin.
 Woolman's Early. See Summer Rose.
 Woollman's Long. See Ortle. *Woolman's*
 Woollman's Striped Harvest. See Summer Rose.
 Wormsley Pippin. Medium, roundish, greenish-yellow; sharp sub-acid. September. English.
 Wright Apple. Medium, roundish-oblate, yellow; tender, juicy, aromatic, almost sweet. Autumn. Vt.
 Wyker Pippin. See Golden Reinette.
 Wythe. Medium, oblate, red streaked; good. Winter.
 Yacht. Large, roundish, striped; sub-acid. Winter. Pa.
 Yacob, p. 336.
 Yates, p. 336.
 Yellow Bellflower, p. 346.
 Yellow German Reinette. See Golden Reinette.
 Yellow Harvest. See Early Harvest.
 Yellow Horse. See Horse.
 Yellow Ingestrie. Small, yellow; spicy—valueless. Foreign.
 Yellow June. See Kirkbridge White.
 Yellow May. See White June eating.
 Yellow Meadow. Large, oblate, greenish-yellow; compact, rich, very good. November. Southern.
 Yellow Newtown Pippin, p. 347.
 Yellow Pearmain. See Golden Pearmain.
 Yellow Siberian Crab, p. 350.
 Yellow Sweet. Very similar to the Smoky Arcad. Hardy in the far North.
 Yellow Transparent, p. 306.
 Yopp. See Yopp's Favorite.
 Yopp's Favorite. Large, roundish, greenish-yellow; juicy, sub-acid, very pleasant. Ga.
 York Imperial, p. 336.
 York Pippin. See Fall Pippin.
 York Russet. See Pumpkin Russet.
 Yorkshire Greening. Large, round ovate, dull green, striped; acid. Winter. English.
 Young's Long Keeper. See Easter Pippin.
 Yost. Flat, striped; coarse, pleasant, sub-acid. December. Pa.

- Zachary. (Zachary Pippin.) Zieber. Small, yellow, striped;
 Large, oblate, red striped;
 good. Early winter. dry, good.
 Zane, or Zane Greening. Large, Zukoff's Winter, p. 347.
 roundish, green; poor. Winter.

APRICOTS.

- Abricot. See Red Masculine.
 Abricot Blanc. See White Masculine.
 Abricot Common. See Roman.
 Abricoti. See Red Masculine.
 Abricotier Hatif. See Red Masculine.
 Abricot Pêche. See Peach.
 Alberge de Montgarnet. See Montgamet.
 Albergier. See Montgarnet.
 Alexander, p. 352.
 Alexis, p. 352.
 Amande Aveline. See Breda.
 Anson's. See Moorpark.
 Anson's Imperial. See Peach.
 Black, p. 352.
 Blanc. See White Masculine.
 Blenheim, p. 352.
 Bourgoume. (Hubbard.)
 Large, round, compressed, yellow; juicy and very acid.
 Early. Of not much value.
 Breda, p. 352.
 Briancon. A small tree or shrub,
 a native of the Alps. Fruit
 small, round, scarcely eatable.
 Ornamental.
 Brown Masculine. See Red Masculine.
 Brussels, p. 353.
 Budd, J. L., p. 353.
 Burlington, p. 353.
 Catharine. Medium, yellow;
 mild sub-acid; good. July 25.
 Russian.
 Dartmouth, p. 353.
 D'Alexandrie. See Musch.
 D'Hollande. See Breda.
 Double Flowering. Ornamental
 —rare here.
 Dubois Early Golden. See Early Golden.
 Du Luxemburg. See Peach.
 Dunmore's Breda. See Moorpark.
 Early Golden, p. 353.
 Early Masculine. See Red Masculine.
 Early Moorpark, p. 353.
 Early Orange. See Orange.
 Early White Masculine. See White Ditto.
 Germine. See Roman.
 Gibb, p. 353.
 Gold Dust. Large, round, reddish-yellow.
 Harris, p. 353.
 Hemshirke, p. 353.
 Japan. Small, greenish-yellow;
 clingstone; flesh hard and acid; poor.

- Lafayette, p. 353.
Large Early, p. 353.
Large Red. Large, roundish oval, orange with red cheek; very good. Ripens about first of August.
Large Turkey. See Turkey.
Montgarnet, p. 353.
Moorpark, p. 353.
Musch, p. 354.
Musch-musch. See Musch.
Nicholas. Medium, white, sweet, melting. July. Russian.
Noir. See Black.
Oldaker's Moorpark. See Moorpark.
Orange, p. 354.
Pêche. See Peach.
Pêche Grosse. See Peach.
Peach, p. 354.
Persian. See Orange.
Precoce. See Red Masculine.
Purple Apricot. See Black.
Red Masculine, p. 354.
Ringgold, p. 354.
Roman, p. 355.
Royal, p. 355.
Royal Orange. See Orange.
Royal Peach. See Peach.
Royal Persian. See Orange.
Shipley's. See Blenheim.
Smith's Early. Medium size, oval, sides flattened, suture very distinct. Early. Resembles Harris. N. Y.
St. Ambroise. Large, roundish, compressed, yellow, shaded dark orange. Prolific, good.
Temple's. See Moorpark.
Texas, p. 355.
Transparent. See Roman.
Turkey, p. 355.
Turkish of Western New York, p. 355.
Violet. See Black.
Walton Moorpark. See Moorpark.
White. See White Masculine.
White Masculine, p. 355.
Wurtemberg. See Peach.

BANANAS.

- Abyssinian (*M. Ensete*), p. 589.
Baracoa (red), p. 589.
Dwarf Jamaica, p. 589.
Hart's Choice, p. 589.
Jamaica (Martinique), p. 589.
Orinoco, p. 589.

BLACKBERRIES.

- Adair's Claret. Medium, pale red; soft, pleasant. Not quite hardy. Ky.
Agawam, p. 357.
Albion. Large, light red, imperfect, poor, not productive.
Ancient Briton, p. 357.
Barnard. Medium, high flavor, has tendency to dry before becoming fully ripe. Canes strong, very prickly.

Bartel Dewberry. Variousl described as large and small. Cylindrical canes, vigorous, not very spiny. Fruit juicy, sub-acid. Finds favor mostly in the West.

Cape May. Large, black; sweet, soft; loses color.

Carlo. Small, juicy, sub-acid. Canes vigorous, drooping, few thorns.

Crystal White. Medium, oblong oval, light creamy white, sweet. Only a curiosity. Not hardy. Ill.

Cumberland. Medium, black; sweet, early. Hardy. N. J.

Cut-leaved. Small, roundish, black; an old European sort.

Cutter's Mulberry. Long, slender; sweet. Mass.

Dewberry, or Low Blackberry. A wild bush, producing sweet, excellent fruit.

Dorchester, p. 357.

Early Cluster, p. 358.

Early Harvest, p. 358.

Early Mammoth. Medium, irregular, bright black, juicy, sub-acid. Canes red, vigorous, drooping, thorny. Not very hardy.

Eldorado. Medium, oblong conical, juicy, sweet. Canes not very vigorous, thorny. Good.

Erie, p. 358.

Evergreen. Small, hard core, sub-acid. Canes straggling, vigorous, stout thorns. Winter kills.

Farley. Large; sweet. Early. New.

Felton. Large, oblong; sweet, good, often defective. Early. N. J.

Holcomb. Large, roundish-oval, black; sweet, very good. Vigorous and productive. Conn.

Kittatinny, p. 358.

Lawton. See New Rochelle.

Lincoln. Small, juicy, sweet, imperfect. Canes vigorous, upright, thorny. Not good.

Logan Berry, p. 359. Its hardiness not yet proven in the Eastern States.

Lovett. Small, juicy, nearly sweet, many imperfect. Canes vigorous, upright, thorny.

Lucretia Dewberry, p. 359.

Luther. Medium, juicy, nearly sweet. Canes vigorous, arched, pale red; thorns slender and numerous.

Mayes' (Austin) Hybrid Dewberry, p. 359.

Mersereau, p. 359.

Minnewaska, p. 359.

Missouri Mammoth, p. 360.

Newman's Thornless, p. 360.

New Rochelle, p. 361.

Oregon Evergreen. See Evergreen.

Rathbun. Medium-sized berry, good flavor, coreless. New.

Sable Queen. Medium or large, black. Mass.

Snyder, p. 361.

Stone's Hardy. Small, productive, extremely hardy.

Taylor, p. 361.

Thompson's Early Mammoth. See Early Mammoth.

Wachusett. (Wachusett Thorn-

less.) Small, oblong oval, juicy, sweet. Canes moderately stout, purplish thorns few and small.

Wilson's Early, p. 361.

Wilson, Jr., p. 361.

CHERRIES.

Adam's Crown. Medium, roundish, pale red; flavor pleasant. Late June.

Afghanistan, p. 366.

Amber Gean. Small, oval heart-shaped, pale yellow; sweet, pleasant. Great bearer. Late.

American Amber. Medium, roundish heart-shaped, light amber and red; flavor moderate.

American Heart, p. 369.

Anne. Rather small, roundish, red; sweet, very good. Ky.

Ansell's Fine Black. See Black Heart.

Apple Cherry. See Gridley.

Archduke, p. 375.

Arden's Early White Heart. See Early White Heart.

Baumann's May. See May Bigarreau.

Belle de Bavay. See Reine Hortense.

Belle de Choisy, p. 378.

Belle d'Orleans, p. 369.

Belle de Sceaux, p. 378.

Belle Magnifique, p. 378.

Belle Vezouris. Rather large, light red; sub-acid. Late.

Bessarabian. Medium, round,

heart-shaped, dark red, acid, slightly astringent. Hardy and prolific. Russian.

Bigarreau. See Yellow Spanish.

Bigarreau, Black. Medium, heart-shaped, black; flesh firm, rather dry. See Medium.

Bigarreau Blanc. See White Bigarreau.

Bigarreau, China, p. 319.

Bigarreau Couleur de Chair. See Elton.

Bigarreau Gaubalais. See Mezel.

Bigarreau de Mai. See May Bigarreau.

Bigarreau Gros Cœur. Large, roundish heart-shaped, suture raised, becoming reddish-black; flesh firm, flavor moderate.

Bigarreau Gros Noir. See Elkhorn.

Bigarreau, Large Red. Large, oblong heart-shaped, dark red; flesh firm. Season medium.

Bigarreau, Royal and Bigarreau Tardif. See Yellow Spanish.

Black Bigarreau of Savoy. Large, heart-shaped, black; flesh purple, firm. Late.

Black Caroon, or Carone. Rather small, intermediate in

- character between the Mazzard and Black Heart—of little value.
- Black Circassian. See Black Tartarian.
- Black Eagle, p. 366.
- Black Hawk, p. 366.
- Black Heart, p. 366.
- Black Honey. See Black Mazzard.
- Black Mazzard. The wild or original type of the Heart varieties of the cherry. Small, oval, heart-shaped, black; bitter. Only valuable for raising stocks.
- Black Republican. See Snelling.
- Black Russian. See Black Tartarian.
- Black Tartarian, p. 367.
- Bleeding Heart. Medium, long heart-shaped, dark red; flavor moderate. Late June.
- Bloodgood's Amber, or Bloodgood's Honey. See American Amber.
- Bower's Early, Medium. Sweet, Cooking. Southern.
- Bowyer's Early Heart. Medium, obtuse heart-shaped, amber and red; flavor pleasant. Middle of June.
- Brandywine, p. 367.
- Brant, p. 367.
- Brenneman's Early. See Cumberland Seedling.
- Bristol Cherry. See Black Mazzard.
- Brusseller Braune. Large, globular, heart-shaped, very dark red; flesh firm, red, acid, astringent; pit large. Tree vigorous, prolific. Middle of July, good. Russian.
- Burr Seedling, p. 369.
- Buttner's Black Heart. Large, nearly black; flesh firm, flavor moderate. German.
- Buttner's October Morello. Small, acid. Late; of little value.
- Buttner's Yellow. Medium, roundish, clear yellow; flesh firm, sweet, of moderate quality. Late.
- Carmine Stripe, p. 370.
- Carnation, p. 378.
- Caroline, p. 370.
- Centennial, p. 370.
- Cerise de Ostheim. Medium, nearly black; flesh firm, tender, juicy, rich; pit small; juice high-colored.
- Cerise Indulle. See Early May.
- Champagne, p. 370.
- Choisy. See Belle de Choisy.
- China Bigarreau, p. 370.
- Cleveland, p. 370.
- Cluster. Quite small, round, red. Two to six in a close cluster on a common stalk; of little value.
- Coe's Late Carnation, p. 378.
- Coe's Transparent, p. 370.
- Common English. See Black Mazzard, and Black Caroon.
- Common Red. See Pie Cherry.
- Compass, p. 380.
- Conestoga, p. 368.
- Cumberland Seedling, p. 368.
- Davenport's, p. 367.
- Delicate, p. 370.
- Doctor, p. 370.
- Dr. Wiseman, p. 372.
- Donna Maria, p. 375.
- Downer, p. 370.

- Downer's Late Red. See Downer.
 Downing's Red Cheek, p. 371.
 Downton, p. 371.
 Duchesse de Palluau, p. 378.
 Dutch Morello. See Morello.
 Dyehouse. Resembles Early Richmond but a week earlier. Kentucky.
 Early Black. See Black Heart.
 Early La Maurie. Medium, heart-shape, purple, sweet, Early. Southern.
 Early May, p. 379.
 Early Morello, p. 375.
 Early Prolific, p. 371.
 Early Purple Guigne, p. 368.
 Early Richmond, p. 379.
 Early White Heart. See White Heart.
 Early York. Medium, flesh greenish-white, tender, juicy, sub-acid.
 Elizabeth. Rather large, heart-shaped, rich dark red; flesh half tender, pleasant. Late June. Ohio.
 Elkhorn, p. 368.
 Elliott's Favorite, p. 372.
 Elton, p. 372.
 English Morello. See Morello.
 Eugenie, p. 375.
 Favorite. Rather small, pale yellow and red; sweet, delicate. Late June. Ohio.
 Flemish. Rather large, oblate, red; sub-acid, not rich.
 Flesh-colored Bigarreau. See Elton.
 Florence, p. 372.
 Four-to-the-Pound. See Tobacco-Leaved.
 Fraser's Black Heart. See Black Tartarian.
 Fraser's Black Tartarian. See Black Tartarian.
 Fraser's White Tartarian. See White Tartarian.
 Gascoigne's Heart. See Bleeding Heart.
 George Glass. See Bessarabian.
 German Mayduke. See Early Purple Guigne.
 Gifford's Seedling. Small round heart-shaped, light red; sweet.
 Governor Wood, p. 373.
 Graffion. See Yellow Spanish.
 Great Bigarreau. See Mezel.
 Gridley. Medium, roundish, black; flesh firm, flavor moderate. Late June. Great bearer. Mass.
 Griotte du Nord. Medium, round, dark red; acid, slightly astringent. Hardy, vigorous; dwarf, slow grower. Russian.
 Griotte Précoce. Belongs to same family as June Morello; ripens ten days later.
 Guigne Noir Luisante. Medium, round heart-shaped, reddish-black; rich, acid. Late July.
 Guigne Noir Tardive. See Elkhorn.
 Hative. See Early May.
 Hildesheim. Medium, heart-shaped, yellow and red; sweet, agreeable.
 Hoadley, p. 372.
 Holland Bigarreau. See Napoleon.
 Holman's Duke. See Mayduke.
 Honey. Small, roundish, yellow and red; very sweet. Late.

- Hoskins, p. 368.
 Hovey, p. 372.
 Hyde's Late Black, p. 372.
 Hyde's Red Heart. Medium, heart-shaped, lively red; pleasant.
- Imperial Morello. Medium, roundish, dark purplish red; acid. Late.
- Intorka. Medium, round, yellow and red; flesh firm, yellowish, sub-acid. Russian.
- Jeffrey's Duke, p. 379.
 Jocosot, p. 368.
 June Morello. Small, round oblate, red, firm; flesh meaty.
- Kennicot, p. 368.
 Kentish Red. See Early Richmond.
- Keokuk. Large, heart-shaped, dark purple, rather coarse, poor. Strong grower; productive. Ohio.
- King's Morello. Fruit of the Richmond type, but larger and better.
- Kirtland's Large Morello. See Large Morello.
- Kirtland's Mammoth, p. 373.
 Kirtland's Mary, p. 373.
 Knevet's Late Bigarreau. See Florence.
- Knight's Early Black, p. 368.
- Lady Southampton's Yellow. Medium, heart-shaped, all yellow; firm, poor. Late.
- Large Black Bigarreau. See Elkhorn.
- Large Heart-shaped Bigarreau. See Bigarreau Grosse Cœur.
- Large Montmorency. Medium or large, dark rich red, tender; rich acid. A week later than Early Richmond. French.
- Large Morello, p. 379.
- Large White Bigarreau. See White Bigarreau.
- Late Archduke. See Archduke.
- Late Duke, p. 376.
- Late Honey. See Honey.
- Late Kentish. See Pie Cherry.
- Leather Stocking, p. 368.
- Lemercier. See Reine Hortense.
- Lewelling, p. 376.
- Lieb. Rather larger than Early Richmond, slightly later and less acid. Supposed to be German.
- Lithaur Weichsel. From Southern Russia. Of not much value.
- Logan, p. 368.
- Louis Philippe, p. 376.
- Lundie Gean. Medium, roundish, black. July.
- Madison Bigarreau. Medium, roundish, yellow and red; pleasant, moderate flavor.
- Mammoth. See Kirtland Mammoth.
- Manning's Late Black, p. 368.
- Manning's Mottled, p. 373.
- May. See Kirtland's Mary.
- May Bigarreau, p. 368.
- May Cherry. See Early May.
- Mayduke, p. 376.
- Mazzard. See Black Mazzard.
- Mercer. Medium, heart-shaped, dark red, sweet, good shipper.
- Merveille de Septembre. Small; rather dry, sweet. Of little value. August, September. French.

- Mezel, p. 369.
 Milan. See Morello.
 Minnesota Ostheim. Smaller than Griotte de Ostheim.
 Monstreuse de Bavy. See Reine Hortense.
 Monstreuse de Mezel. See Mezel.
 Montmorency, p. 377.
 Montmorency Ordinaire, p. 377.
 Morello, p. 377.
 Mottled Bigarreau. See Manning's Mottled.
- Napoleon, p. 374.
- Ohio Beauty, p. 374.
 Olivet, p. 377.
 Orel. Large, black, quite acid. Tree very dwarf and hardy.
 Orel Sweet. Medium, black; flesh firm and very sweet. juice colored. East Europe.
 Orleans. See Belle d'Orleans.
 Osceola, p. 369.
 Ostheim, p. 377.
 Ox-Heart (of the English). Large obtuse heart-shaped, dark red; half-tender, of second quality. The name of Ox-heart is erroneously applied here to the White Bigarreau and to several worthless sorts.
- Philippe. See Louls Philippe.
 Pie Cherry, p. 379.
 Pierce's Late. Medium, heart-shaped, amber and dark red; flesh tender, sweet, rich. Late. Mass.
 Plymouth Rock. Medium, heart-shaped, amber-colored, overspread with red. New, highly spoken of.
 Plumstone Morello, p. 379.
 Pontiac, p. 369.
 Portugal Duke. See Archduke.
 Powhatan, p. 369.
 Précoce. See Early May.
 President. Large, dark red; half tender, sweet. Late June.
 Proudfoot. Large, heart-shaped, dark purplish-red; flesh firm, sweet. Late. Ohio.
- Red Jacket, p. 374.
 Reine Hortense, p. 380.
 Remington White Heart. Small, heart-shaped, yellow; flavor poor. Very late. Worthless.
 Richardson, p. 369.
 Richmond. See Early Richmond.
 Rivers' Early Amber. Resembles Early White Heart, but later.
 Rivers' Early Heart. Medium, heart-shaped. Rather early, but poor. English.
 Robert's Red Heart. Medium, round heart-shaped, pale amber and pale red; with a good flavor. Late June. Mass.
 Rockport Bigarreau, p. 374.
 Rocky Mountain, p. 380.
 Ronald's Large Black Heart. See Black Tartarian.
 Ronald's Large Morello. See Morello.
 Royal Ann. See Napoleon.
 Royal Duke, p. 378.
 Rumsey's Late Morello. Large, roundish heart-shaped; rich red, juicy, acid. Late August. Of little value.

- Sand Cherry, p. 380.
- Schmidt. Very large, deep black; flesh dark, tender, juicy, sweet. Prolific.
- Schmidt's Bigarreau. Medium, light yellow.
- Shadow Morello. Large, nearly black; juice highly colored. Said to be valuable for canning. Tree bush-like.
- Shannon, p. 378.
- Shubianca. Large, black, acid, juice colored. Tree bush-like and very hardy.
- Sklanka. Large, yellow with red cheek, sub-acid, productive, good. Russian.
- Small May. See Early May.
- Smidt's Yellow. Medium, yellow, marbled red. Prolific. Early. Good Southern variety.
- Spanish. See Yellow Spanish.
- Spanish Black Heart. See Black Heart.
- Sparhawk's Honey. Medium, round heart-shaped, regular, pale and bright red; sweet. Late June.
- Strauss Weichsel. Medium, roundish-oblate, short stalk; flesh dark red, firm, juicy, slightly astringent; pit small. Good.
- Street's May. See Early White Heart.
- Swedish. See Early White Heart.
- Sweet Montmorency, p. 375.
- Tartarian, p. 316.
- Tecumseh, p. 369.
- Tobacco-leaved. Leaves large, fruit small. Worthless.
- Townsend, p. 375.
- Tradescant's Black Heart. See Elkhorn.
- Transparent Guigne, or Transparent Gean. Small, oval heart-shaped, pink and red, pellucid; tender, slightly bitter, becoming rich and good. Rather late. Tree vigorous and productive.
- Triumph of Cumberland. See Cumberland's Seedling.
- Utah Hybrid, p. 381.
- Vail's August Duke, p. 380.
- Vilne Sweet. Large, sweet. Russian.
- Virginian May. See Early Richmond.
- Wax Cherry. See Carnation.
- Wendell Mottled Bigarreau, p. 369.
- Werder Early Black Heart, p. 369.
- Western Dwarf. See Rocky Mountain.
- White Bigarreau, p. 375.
- White Heart, p. 371.
- White Oxheart. See White Bigarreau.
- White Tartarian. Rather small, wholly pale yellow, somewhat pellucid, with a moderate, rather bitter flavor. [A spurious White Tartarian, but of better quality, is light pink and red, with a sweet, good flavor.
- Windsor, p. 375.
- Wiseman. See Dr. Wiseman.
- Wood. See Gov. Wood.
- Wragg. Medium, round, dark purple. Vigorous and productive.

Yellow Glass. Large, bright yellow; flesh firm, fine-grained, juicy, sweet. Russian. **Yellow Honey.** See Honey.
Yellow Spanish, p. 375.

CITRON.

Fingered Citron, p. 649. **Lyman,** p. 650.
Lemon, p. 649. **Orange,** p. 650.

CRANBERRIES.

Bell, p. 385. **Gould,** p. 384.
Cherry, p. 385. **Lewis,** p. 384.
Dennis, p. 384. **Makepeace,** p. 384.
 McFarlin, p. 384.
Early Black, p. 384. **Neville,** p. 384.
Early Red, p. 384.
Franklin, p. 384. **Shaw,** p. 385.

CURRENTS.

Attractor, p. 388. **Danen's Selected.** See Knight's Sweet Red.
Belle de St. Gilles. See Red Dutch. **Fay,** p. 389.
Black English. See Common Black. **Fertile.** See Red Dutch.
Black Naples, p. 391. **Fertile Currant of Paluau.** See Paluau.
Blanc Transparent. See Transparent. **Fertile d'Angers.** See Versailles.
Bertin No. 1. See Knight's Sweet Red. **Fertile d'Angleterre.** See Red Dutch.
Bertin No. 9. See Red Dutch. **Fertile de Bertin.** See Red Dutch.
Champagne. Medium, pink or very pale red; rather acid. **Fielder's Red.** See Knight's Sweet Red.
Champion, p. 392.
Chenonceaux. See Red Dutch. **Giant Ruby.** (Moore's Ruby.) Large, dark crimson, vigorous, productive, new.
Cherry, p. 389.
Common Black, p. 392.
Crandall, p. 392. **Gloire des Sablons.** Medium,

- bunches long, loose, white, striped red; acid. Unproductive.
- Goliath. See Knight's Sweet.
- Gondoin Red, p. 389.
- Gondoin White, p. 390.
- Grosse Rouge de Boulogne. See Red Dutch.
- Hâtive de Bertin. See Red Dutch.
- Holland, p. 390.
- Houghton Castle. See Victoria.
- Imperial Yellow, or Imperial White. See White Grape.
- Knight's Early Red. Possesses no distinctive merits, being scarcely earlier than other sorts.
- Knight's Large Red, p. 390.
- Knight's Sweet Red, p. 390.
- La Hâtive. See Red Dutch.
- Large-Fruited Missouri. A large-sized variety of the Missouri Currant (*Ribes aureum*), possessing a pleasant flavor.
- Large Sweet Red. See Knight's Sweet Red.
- Lee's Black Prolific, p. 392.
- Le Fertile. Large, deep red, vigorous, very productive.
- London Market, p. 390.
- Long-Bunch. See Holland.
- Macrocarpa. Nearly resembles the Cherry Currant, but more productive.
- May's Victoria. See Gondoin Red.
- Missouri. See Large-Fruited Missouri.
- Moore's Ruby. See Giant Ruby.
- Morgan's Red. See Red Dutch.
- Morgan's White. See White Dutch.
- North Star, p. 390.
- Palmer's Late Red. See Knight's Sweet Red.
- Paluau, p. 391.
- Pitmaston Red. See Knight's Sweet Red.
- Pitmaston Prolific. See Knight's Sweet Red.
- Pleasant Eye. See Champagne.
- Pomona. Medium size, red, productive, sweet. New.
- Prince Albert, p. 391.
- Prince of Wales, p. 392.
- Queen Victoria. See Red Dutch.
- Raby Castle. See Gondoin Red.
- Red Cherry. See Versailles.
- Red Cross, p. 391.
- Red Dutch, p. 391.
- Red Grape. See Red Dutch.
- Red Provence. Late, acid; vigorous, shoots reddish.
- Reeve's White. See White Dutch.
- Rouge d'Holland. See Gondoin Red.
- Short-Bunched (London Red). Strong, upright grower, good size berries.
- Striped Fruited. Small, striped, of little value. German.
- Transparent, p. 391.
- Versailles, p. 391.
- Victoria, p. 391.

- White Antwerp. Large, bunches rather long; sweet; very productive.
- White Clinton. Closely resembles or is identical with White Dutch.
- White Crystal. See White Dutch.
- White Dutch, p. 391.
- White Grape, p. 391.
- White Leghorn. See White Dutch.
- White Provence. Large white; the most vigorous of the white sorts, but moderately productive. Leaves often edged with white. New.
- Wilder, p. 391.
- Wilmot's Red Grape. Resembles May's Victoria; good and productive.
- Zante. See "Grapes."

DATE—See p. 591.

FIG.

- Adriatic, p. 663.
- Angelique, p. 663.
- Athens, p. 663.
- Black Genoa, p. 664.
- Black Ischia, p. 663.
- Brown Turkey, p. 599.
- Brunswick, p. 663.
- California Black, p. 600.
- Celestial, p. 664.
- Dotato, p. 664.
- Du Roi, 664.
- Early Lemon. See Angelique.
- Madonna. See Brunswick.
- Marseillaise, p. 664.
- Mission, p. 664.
- Monoco Bianco, p. 664.
- San Pedro Black, p. 664.
- San Pedro White, p. 664.
- Smyrna, p. 664.

GOOSEBERRIES.

- Champion, p. 395.
- Chautauqua, p. 393.
- Columbus, p. 393.
- Crown Bob, p. 393.
- Downing, p. 395.
- Golden Prolific, p. 396.
- Houghton's Seedling, p. 395.
- Industry, p. 393.
- Lancashire Lad, p. 394.
- Mountain, p. 396.
- Pale Red, p. 396.
- Pearl, p. 396.
- Raby Castle. Medium, bright red, clusters long; hardy and vigorous. An English variety.
- Red Jacket, p. 397.
- Red Warrington, p. 394.

Smith's, p. 397.

Triumph, p. 394.

Transparent. Medium size, light red, sweet; productive; stems spreading. Ohio.

Wellington's Glory, p. 395

Whitesmith, p. 395.

GRAPES.

Ada. Bunches large, compact, berries dark; sweet, vinous. Flushing, L. I.

Adirondac, p. 419.

Agawam, p. 424.

Alexander's, p. 419.

Allen's Hybrid, p. 425.

Alvey, p. 419.

Amber, p. 424.

Amiens. See Royal Muscadine.

Anna, p. 425.

Arkansas. Closely resembles or is identical with Norton's Virginia.

August Muscat. Berries small, oval, black; poor quality. A weak grower. Very early.

Barnes. Bunches and berries medium, black; sweet, good. Quite early. New.

Barry, p. 419.

Beagle. Bunch small, long, loose; berry below medium, round, black; flesh rather dry, vinous. Ripe September. Texas.

Berckman's, p. 419.

Black Corinth, or Zante Currant. Small, round, black; quality moderate.

Black Eagle, p. 419.

Black Spanish. Large black; hardy, productive. For South.

Black German. See York Madeira.

Blanco. Bunch medium; berry rather small, round; flesh juicy, sweet, pulp tender. Texas.

Bland, p. 424.

Bland's Madeira, Bland's Pale Red, and Bland's Virginia. See Bland.

Blood's Black. Large, coarse, foxy. Early.

Boston. See Black Prince.

Brant, or Arnold's No. 8. Bunch and berry resembling Clinton, but much better in quality. Hardy, strong grower, very early. New.

Brighton, p. 420.

Brilliant, p. 420.

Brincklé. Bunches large, compact, berries round, black; flesh solid, not pulpy; flavor rich, vinous. Phila.

Bull, or Bullet. See Scuppernong.

Bullitt. See Taylor's Bullitt.

Campbell's Early, p. 420.

Canada, or Arnold's No. 16. Bunch and berry above medium, black, rich, aromatic. Hardy, moderate grower.

Canadian Chief. Bunches large, shouldered; vine productive. Of foreign origin.

Canby's August. See York Madeira.

- Cape Grape.** See Alexander's.
Carman, p. 420.
Carter. Berries large, round, reddish-black, of good quality. A season medium.
Cassady, p. 426.
Catawba, p. 420.
Catawba Tokay. See Catawba.
Cayuga, p. 420.
Centennial. Bunch and berry medium; light red, tender, rich, vinous. Watertown, N. Y.
Champion. Bunch medium, compact; berries medium, round, black, of poor quality. A strong grower, productive and showy, and profitable for market in some places.
Clara, p. 426.
Clifton's Constantine. See Alexander's.
Clinton, p. 420.
Clover Street Black. Bunches and berries large, black; very good. Cross of native and foreign. Rochester, N. Y. New.
Coleraine. Bunch medium; berry rather small, whitish, juicy, very sweet, hangs well to the stems.
Columbia. Bunches small, compact; berries small, black; pleasant, vinous. Georgetown, D. C.
Columbian. Bunch large, compact; berry very large, round, black.
Concord, p. 420.
Cornucopia, p. 420.
Cornucopia Bunch. Berry small, cracks badly.
Cottage, p. 421.
Creveling, p. 421.
Critic. A seedling of Jefferson, resembles Delaware, though not so good.
Croton, p. 426.
Cuyahoga, p. 426.
Cynthiana, p. 421.
Damascus. Bunches large; berries very large, black; rather acid. Exotic—requires fire-heat.
Dana. Bunches and berries medium, dark red; slightly vinous, fine. Roxbury, Mass. New.
Delaware, p. 424.
Devereux. Bunches medium; berries small, purple; sweet. Foreign.
Diamond, p. 426.
Diana, p. 424.
Diana Hamburg, p. 424.
Dracut Amber. A brown fox, somewhat resembling but not equal in flavor to the Northern Muscadine.
Duchess, p. 426.
Dutch Sweetwater. Bunches medium; berries large, oval, amber; good early white grape. Foreign.
Early Dawn. Bunch medium, long, shouldered; berry round, black, with a thick bloom; rich and of good quality. Quite early. A cross of Israella and Muscat Hamburg. Origin, Newburg, N. Y.
Early Golden Campbell, p. 368.
Early Sweetwater. See White Sweetwater.
Early Victor, p. 421.
Eaton, p. 421.
Elsinborough, or Elsinburgh, p. 421.

- Elvira. Bunch medium; berry medium, round, pale green, tender, sweet; hangs well to the vine and is improved by slight frost. Missouri.
- Emily. Berries rather small, pale red, excellent; of foreign parentage. A worthless native also has this name.
- Empire State, p. 426.
- Essex, p. 421.
- Eumelan, p. 421.
- Flowers. Bunch small; berry medium, round, black, sweet.
- Fox Grape. A name applied to the several wild varieties of *Vitis labrusca* at the North, usually possessing a strong musky aroma; and to the Scuppernong at the South.
- Framingham. Medium, black, very early; quality moderate. Mass.
- Franklin. Bunches medium; berries rather small, bluish purple; rather acid, moderately good. A strong grower and productive.
- Garrigues. See Isabella.
- Goethe, p. 424.
- Golden Campbell, p. 424.
- Golden Clinton. A greenish-white seedling of the Clinton. Rochester, N. Y.
- Graham. Bunches medium, shouldered, not compact; berries round, purple, little or no pulp, good. Pa.
- Green Golden, p. 426.
- Green Mountain, p. 426.
- Gros Colman. Bunches large; berries large, round, black. Foreign. New.
- Grove End Sweetwater. See Early White Sweetwater.
- Hall's Grape. Berries medium, dark; quality and season medium. Ohio.
- Hardy Blue Windsor. See Esperione.
- Harris. Medium, black; sweet, with pulp. Productive. Southern.
- Hartford Prolific, p. 421.
- Hayes, p. 426.
- Heath. See Delaware.
- Herbement, p. 421.
- Herbert (two varieties), p. 421.
- Highland, p. 421.
- Hosford, p. 421.
- Howell. Bunches and berries medium, black; skin thick, pulp firm, good. Early. New.
- Hudson. Resembles Isabella, but not so rich and sprightly. Hudson, N. Y.
- Hyde's Eliza. Intermediate in appearance between Isabella and Clinton. Growth not as strong as Isabella, but earlier.
- Iona, p. 425.
- Isabella, p. 422.
- Israella, p. 422.
- Ives, p. 422.
- Janesville. An early black grape, of moderate size, ripening with Hartford, of rather poor quality. Western. Valuable only in cold regions.
- Jefferson, p. 425.
- Labé. Bunches medium; ber-

- ries large, black, pleasant.
Pa.
- Lady. Berry and bunch medium, light greenish-yellow, tender, sweet. Early; hardy.
Ohio.
- Lady Washington, p. 426.
- Large German. See York Madeira.
- Lawrence, p. 422.
- Lenoir, p. 422.
- Lindley, p. 425.
- Logan, p. 422.
- Longworth's Ohio. See Ohio.
- Louisa. See Isabella.
- Lucile. Medium size, red, vigorous, hardy, productive.
New.
- Lydia, p. 427.
- Lyman. Bunches small, compact; berries round, smooth, black; resembles Clinton in flavor.
- Macready's Early. Bunches compact; berries white, pointed; juicy, melting, pleasant. Foreign.
- Mammoth Catawba. Bunches large, not compact; berries large, round, red—does not equal Catawba in flavor.
- Marion. Bunches rather large, compact; berries medium, black, purple, with bloom; flavor sharp. Of the Clinton family; becomes eatable in winter.
- Marionport. See York Madeira.
- Martha, p. 427.
- Mary, p. 427.
- Mary Ann. Bunches large, oblong oval, black; sweet, very foxy. Early.
- Massachusetts White. A large, light brown fox—of little or no value.
- Massasoit, p. 425.
- Maxatawney, p. 427.
- McPike. Very large, black, skin thin, juicy, sweet, resembles Eaton. Ill.
- Meade's Seedling. Closely resembles its parent, the Catawba, but a little darker and better. Mass.
- Merrimac, p. 422.
- Michigan, p. 425.
- Miles, p. 422.
- Mills, p. 366.
- Miner's Seedling. See Venango.
- Missouri, p. 422.
- Monroe. Bunch medium, shouldered; berries medium, round, black; vinous and sprightly; early. Rochester, N. Y.
- Moore's Early, p. 422.
- Mottled, p. 423.
- Niagara, p. 427.
- Noah. Bunch medium, compact, shouldered; berry medium, round, pale yellow, pulp hard, sweet, of moderate quality. Illinois.
- Nonantum. Bunches small, berries good size; black, free from pulp; good. Mass.
- Northern Muscadine, p. 425.
- Norton, or Norton's Virginia, p. 423.
- Ohio, p. 423.
- Ontario. See Union Village.
- Oporto. A native with small bunches, and rather small berries, dark; acid. Claimed as good for wine, its only merit.

- Osage. Bunch large, shouldered; berry large, round, black, blue bloom; flesh juicy, sweet, foxy.
- Othello. Berry and bunch large; rather firm, very good. Productive. Season medium. Paris, Ontario.
- Ozark. Bunch large, compact, shouldered; berry medium, round, black, blue bloom.
- Palestine. Bunches immense; berries small, amber; sweet. Foreign.
- Pauline. Bunches large, compact, shouldered; berries medium, brownish-red; sweet without pulp. Southern.
- Payn's Early. See Isabella.
- Perkins. Bunch rather small, conical, shouldered; berry round, amber, whitish bloom. A brown fox grape, resembling Northern Muscadine, but lighter colored and inferior in quality.
- Peter Wylie. Bunch small; berry small, red. Little value.
- Pocklington, p. 427.
- Powell. See Bland.
- Prentiss, p. 427.
- Purple Urbana. See Logan.
- Raabe, p. 423.
- Rebecca, p. 427.
- Rochester. Bunch large, shouldered, compact; berry medium, dark lilac purple, sweet, rich, aromatic; vine very vigorous and healthy. Early September. Rochester, N. Y.
- Rogers' Hybrids, p. 368.
- Rogers' No. 41. See Herbert.
- Rogers' No. 43. See Barry.
- Royal Vineyard. Bunches and berries large, amber; rich, aromatic. Foreign. New.
- Salem, p. 425.
- Schiras, p. 427.
- Schuylkill Muscadel. See Alexander's.
- Scuppernong, p. 427.
- Secretary. Bunch large, shouldered, loose; berry large, black, tender. For amateur culture only. Newburg, N. Y.
- Segar Box. See Ohio.
- Senasqua, p. 423.
- Spring Hill Constantia. See Alexander's.
- St. Catherine. Bunches and berries large; sweet, tough, very foxy.
- Talman. See Champion.
- Tasker's Grape. See Alexander's.
- Taylor's Bullitt, p. 427.
- Telegraph, p. 423.
- Thomas. Bunch small; berry large, oblong, transparent, violet; pulp tender, sweet, vinous. Makes a superior red wine. Southern.
- To-Kalon, p. 423.
- Trebbiano. Resembles Syrian, but better—keeps well. Foreign.
- Trentham Black. Resembles Black Prince—better in quality. Foreign.
- Tryon. See York Madeira.
- Ulster Prolific. Bunch small; berry small, round, bright red, good. Vine weak grower.

Underhill's Seedling. A red or brown fox, with large, round berries, tough pulp, of moderately foxy flavor.

Union Village, p. 423.

Venango, p. 425.

Vergennes, p. 423.

Walter, p. 425.

Warren. See Herbemont.

White Catawba. Bunches medium, compact; berries large, round, white; sweet. Cincinnati, Ohio.

White Corinth. Bunches compact; sweet, pleasant. Foreign.

White Gascoigne. Bunches and berries oval, good. Foreign.

Wilder, p. 423.

Wilmington. Bunches and berries large, white; acid, showy.

Winchell. See Green Mountain.

Winchester. See Union Village.

Winnie. See Alexander's.

Winslow. Bunches small, compact; berries small, black; resembles Clinton, but earlier. Ohio.

Woodruff red. Bunch large, shouldered; berry large, red.

Worden, p. 423.

Wyoming Red. Medium, early, vigorous and hardy, quality moderate.

Yeddo. Bunches medium, berries brown; excellent. Rather late.

York Madeira. Bunches short, thick, compact; berries roundish-oval; excellent. Productive and hardy. Pa.

Zante Currant. See Black Corinth.

GUAVA.

Psidium Cattleyanum, p. 601.

Psidium Lucidum, p. 601.

HUCKLEBERRIES, p. 551.

See Wild and Unclassified Fruits, p. 744 of this Index.

LEMONS.

Belair, p. 583.

Bonnie Brae, p. 647.

Eureka, p. 647.

Genoa. See Eureka.

Imperial Messina, p. 647.

Lisbon, p. 647.

Sicily, p. 647.

Villafranca, p. 647.

LIMES.

- French (False Lemon), p. 652. Mandarin. See Sour Rangpur.
 Imperial, p. 652. Mexican, p. 652.
 Kurna, p. 6 2. Rangpur, p. 652.
 Turang, p. 588.

LOQUAT.

- Advance, p. 668. Victor, p. 668.

MEDLARS, p. 553.

See Wild and Unclassified Fruits, p. 744 of this Index.

MULBERRIES.

- Downing, p. 429. Russian, p. 430.
 Downing's Everbearing. See Rives. No special value. Tex-
 Downing. as.
 Hicks, p. 429. Spalding. A seedling of Down-
 Hicks' Everbearing. See Hicks. ing.
 Johnson, p. 429. Stubbs, p. 430.
 New American, p. 430. Tea's Weeping, p. 430.
 Ramsey's White. A white Victoria. Large, black, sweet.
 berry; bears young. Very productive. Russian.

NECTARINES.

- Anderson's. See Newington. Claremont. See Elruge.
 Aromatic. See Early Violet. Common Elruge. See Elruge.
 Black. See Early Newington. Coosa. Large, red, white flesh.
 Black Murray. See Murry. From Ga.
 Boston, p. 432. Cowdray White. See New
 Broomfield. Large, roundish, White.
 yellow, with a dull red cheek; D'Angleterre. See Newington.
 rather pleasant. Late. Mass. Downton, p. 431.
 Bruignon Musquée. See Red Du Tilly's. See Duc de Tel-
 Roman. liers.

- Early Black. See Early Newington.
- Early Brugnion. See Early Violet.
- Early Newington, p. 432.
- Early Violet, p. 431.
- Elruge, p. 431.
- Emerton's New White. See New White.
- Fairchild's. Small, round, flattened, yellowish-green, with a red cheek; flesh yellow, dry, poor. Earliness its only merit.
- Fine Gold-Fleshed. See Golden.
- Flanders. See New White.
- French Newington. See Newington.
- Golden. Medium; roundish-ovate, yellow, with a scarlet cheek; firm, poor. Late. Cultivated only for its beauty. [Prince's Golden Nectarine resembles this, but is larger, a week later, and has larger flowers.]
- Hardwicke, p. 432.
- Hunt's Tawny, p. 432.
- Kirkman's Mammoth. Very large, quality fair. N. C.
- Large Scarlet. See Early Violet.
- Lewis. See Boston.
- Lucombe's Seedling. See Early Newington.
- Murry. Medium, roundish, pale green with a red cheek; sweet, of good flavor. 20th of August. English. Poor bearer—little known here.
- Newington, p. 433.
- New Scarlet. See Early Violet.
- New White, p. 432.
- Oatlands. See Elruge.
- Old Newington. See Newington.
- Old Roman. See Red Roman.
- Old White. See New White.
- Orange. See Golden.
- Perkins' Seedling. See Boston.
- Peterborough. Small, roundish, green; flesh juicy, of tolerable flavor. October.
- Pitmaston Orange, p. 432.
- Red Roman, p. 433.
- Roman. See Red Roman.
- Scarlet. See Newington.
- Scarlet Newington. See Newington.
- Smith's Newington. See Newington.
- Stanwick. Rather large, roundish, oval, greenish-white, red in the sun; tender, juicy, rich, sugary.
- Telliers, p. 432.
- Temple's. See Elruge.
- Victoria. Medium, purple, dark brownish cheek.
- Violet Musk. See Early Violet.
- Violet Musquée. See Early Violet.
- Violette Hative. See Early Violet.
- Williams' Orange. See Pitmaston's Orange.

NUTS.

Chestnuts:

- Advance, p. 442.
 - Alpha, p. 442.
 - Bartram Late, p. 442.
 - Black, p. 442.
 - Comfort. Large, glossy, handsome, early. One of the best.
 - Dager, p. 442.
 - Early Reliance, p. 442.
 - Eureka, p. 443.
 - Felton, p. 443.
 - Giant, p. 444.
 - Hannum, p. 443.
 - Kerr, p. 443.
 - Killen, p. 443.
 - Mammoth, p. 443.
 - Murrell, p. 382.
 - Native, p. 382.
 - Numbo, p. 443.
 - Paragon, p. 444.
 - Parry's Superb, p. 444.
 - Pedigree Mammoth. See Mammoth.
 - Reliance. Large, handsome, good.
 - Ridgely, p. 444.
 - Success, p. 444.
 - Tamba-guri, p. 441.
 - Wild, p. 383.
- Chinquapin, p. 444.

Hazelnuts:

- Native forms, p. 444.
- Istrian, p. 444.
- Bond Nut, p. 447.
- Cape Nut. See Frizzled Filbert.
- Cob, p. 448.
- Cosford, p. 448.
- Downton Square, p. 448.

Hazelnuts:

- Dwarf. See Pearson.
- Frizzled, p. 448.
- Filbert Cob. See Lambert Filbert.
- Kentish Cob. See Lambert Filbert.
- Lambert, p. 448.
- Miss Young's. See Cosford.
- Nottingham. See Pearson.
- Pearson, p. 449.
- Purple, p. 449.
- Red, p. 449.
- Round Cob. See Cob.
- White, p. 449.

Hickories:

Pecans:

- Biloxi, p. 451.
 - Centennial, p. 452.
 - Columbian, p. 452.
 - Faust, p. 452.
 - Frotscher, p. 452.
 - Gonzales, p. 452.
 - Idlewild, p. 452.
 - Jewett, p. 452.
 - Jumbo, p. 452.
 - McCallister, p. 453.
 - Pearl, p. 453.
 - Ribera, p. 453.
 - Risien, p. 453.
 - San Sata, p. 453.
 - Stuart, p. 453.
 - Van Deman, p. 453.
- Shellbark Hickories:
- Thin Shell, p. 454.
 - Oval, p. 454.
 - Quadrangular, p. 455.
 - Long Ovate, p. 455.
 - Round Compressed, p. 456.

- Shellbark Hickories:
 Round Oblique, p. 456.
- Walnuts:
 Butternuts, p. 451.
 Black Walnut, p. 458.
- Walnuts, Persian:
 Barthieveana, p. 460.
 Chalbert, p. 461.
 Franquette, p. 461.
 Gilbosa, p. 460.
 Intermedia Pyriformis, p. 460.
- Walnuts, Persian:
 Kaghagi, p. 461.
 Mayette, p. 461.
 Parisienne, p. 461.
 Præparturiens, p. 461.
 Regia microcarpo, p. 460.
 St. Jean, p. 461.
- Walnuts, Asian and Japanese:
 Cordiformis, p. 461.
 Japan, p. 463.
 Juglans Manchuria, p. 463.
 Sieboldiana. See Japan.

ORANGES.

- Amory, p. 578.
 Amory's Malta Oval, p. 641.
 Arcadia. See Whittaker.
 Australian, p. 644.
- Bahia. See Washington Navel.
 Beach's No. 5, p. 642.
 Bergamot, p. 645.
 Bittersweet, p. 645.
 Boone, p. 642.
 Botelha, p. 642.
 Brazilian, p. 643.
 Brown of Thos. Rivers. See Hart's Late.
- Centennial, p. 642.
 Circassian, p. 642.
 Citrus Desimatus, p. 645.
 Cunningham, p. 642.
- De Colmar, p. 642.
 Double Imperial, p. 644.
 Duroi, p. 642.
- Early Oblong, p. 642.
 Egyptian, p. 644.
- Fortuna, p. 641.
- Foster, p. 642.
- Hart's Late, p. 643.
 Homosassa, p. 642.
- Imperial, p. 642.
 Indian River. See Whittaker.
- Jaffa, p. 641.
 Jaffa Blood, p. 641.
 Joppa, p. 643.
- King (King of Siam), p. 645.
 Kum Quat, p. 645.
- Magnum Bonum, p. 642.
 Majorca, p. 641.
 Mandarin, p. 644.
 Maltese Blood, p. 641.
 Maltese Egg, p. 641.
 Maltese Late, p. 641.
 Maltese Long, p. 641.
 Maltese Navel, p. 644.
 Maltese Oblong, p. 641.
 Maltese Oval, p. 641.
 Mediterranean, p. 642.
 Myrtle-leaved Orange, p. 645.

Navel Oranges, p. 643.

Nicaragua, p. 642.

Nonpareil, p. 642.

Paper Rind St. Michael's, p. 643.

Parson Brown, p. 578.

Peerless, p. 642.

Pernambuco, p. 642.

Pineapple. See Whittaker.

Portugal Oranges, p. 642.

Prata, p. 643.

Pride of Malta, p. 642.

Rivers', p. 643.

Rivers' Prolific, p. 642.

Rio, p. 642.

Sanford's Mediterranean Sweet,
p. 578.

Satsuma, p. 645.

Spice (Cleopatra), p. 645.

Stark (De Bary Seedless). See
Whittaker.

St. Michael Blood, p. 642.

St. Michael's Egg, p. 642.

Sustain, p. 643.

Sweet China Oranges, p. 578.

Sweet Seville, p. 642.

Tahiti, p. 642.

Tangerines, p. 645.

Tangerona, p. 645.

Tardiff. See Hart's Late.

Tephi, p. 641.

Valencia Late, p. 641.

Washington Navel, p. 644.

Whitaker, p. 642.

White, p. 643.

PEACHES.

Abricottée. See Yellow Admirable.

Acton Scott. Medium, rather woolly, nearly white, with a red cheek; flesh pale to the stone, rich, sometimes a little bitter. Early English. Rare here.

Admirable. See Early Admirable.

Admirable Jaune. See Yellow Admirable.

Admirable Tardive. See Belle de Vitry.

Albert. (Early Albert.)

Albert's Late Rareripec. Large, yellowish-white and red. A Southern variety, where it ripens in September.

Albright's October Cling, Large, round, white; flesh

juicy, sweet. Said to keep laid away like apples until Christmas. Late. N. C.

Alexander, p. 478.

Alexander Noblesse. Large; flesh buttery, rich.

Algiers Yellow, or Algiers Winter. See Late Yellow Alberge.

Alpha. See Alexander.

Amelia. Stroman's Carolina, Orangeburg, Rayger's June.)

Large, roundish-oblong, light yellow and crimson; melting, vinous, rich; freestone.

Ripens at the North, end of August; at the South, in July.

Amsden, p. 478.

Anne. See Early Anne.

Apricot Peach. See Yellow Admirable.

- Arkansas Traveller. Medium size; white, nearly covered with dark red; juicy, sweet, nearly free. Early. Arkansas. Claimed by some to be identical with Alexander.
- Astor, p. 478.
- Austin's Late Red. Large, oblong, white and red; clingstone. October. Southern.
- Avant Blanche. See White Nutmeg.
- Baldwin's Late, p. 483.
- Baltimore, p. 485.
- Barnard, p. 485.
- Barrington, p. 479.
- Batchelder. Large, round, white with a blush; flesh white; juicy, vinous. End of September. Mass.
- Baugh, p. 483.
- Baxter's Seedling. See Jane.
- Beers' Smock. See Smock Free.
- Belle Bausse. Large, deep red; flesh white; melting, vinous; very good. September. French.
- Belle Beauté. See Grosse Mignonne.
- Belle de Vitry, p. 476.
- Bellegarde, p. 479.
- Belle of Georgia. Large, white with red cheek; flesh white, firm, good. Seedling of Chinese Cling. Ga.
- Berencie. Large, yellow, mottled dark crimson, flesh yellow, juicy, rich. Chinese blood. Ga. Good.
- Bergen's Yellow, p. 487.
- Bidwell's Early. Medium; cream white, washed carmine; cling. Seedling of Peen-to.
- Bidwell's Late. Large, yellow white; flesh juicy, sweet, cling. Ripens three weeks after Peen-to.
- Bilyen. (Bilyen's Late October, Bilyen's Comet.) Large, white, red cheek; flesh firm, white, juicy, sweet, free. Good shipper. Md.
- Blanton Cling, p. 489.
- Blood Cling, p. 490.
- Bordeaux Cling. Large, oval, downy, yellow with a red cheek; flesh yellow, red at stone; juicy, vinous; very good. First of August.
- Bouridine. See Late Admirable.
- Brandywine. Large, yellow, free. Does well South.
- Brentford Mignonne. See Bellegarde.
- Brevoort, p. 483.
- Brevoort's Seedling Melter. See Brevoort.
- Brice's Early. See Alexander.
- Briggs' May. Medium, roundish-oval, shaded and striped red on white skin. Ripens with Amsden. Leaves serrate.
- Brigdon, p. 485.
- Brown Nutmeg. See Red Nutmeg.
- Buckingham Mignonne. See Barrington.
- Butler's Late. Large, whitish with red cheek; flesh white, firm, good. Tree vigorous and productive. Late. Va.
- Cambridge Belle. Large, roundish, reddened in the sun; rich, fine; handsome. Early September. Mass.
- Carman. Large, creamy white,

- splashed red, tough skin, flesh tender, rich, juicy, good. Ga. New.
- Carpenter's White, p. 479.
- Catherine, p. 488.
- Champion, p. 479.
- Chancellor, p. 483.
- Charlotte. See Royal Charlotte.
- Chili Seedling No. 2. Large, round, distinct suture; yellow and dark red mottled; flesh yellow, juicy, vinous, rich. An improvement of Hill's Chili.
- Chinese Cling, p. 488.
- Chinese Peach. See Flat Peach of China.
- Claret Clingstone. See Blood Clingstone.
- Clinton. Medium, roundish, red on yellow; juicy; good. Late August.
- Cole's Early Red, p. 479.
- Cole's White Melocoton. See Morris White.
- Colonel Ausley's. See Barrington.
- Columbia, p. 487.
- Columbus June, p. 483.
- Conkling. Large, round, golden yellow with a crimson cheek, high flavored. Early autumn. New.
- Conner's Cling. (Connor's White.) Medium, white, tinged red; flesh white, red at pit, firm; not very good.
- Connet's Early. Large, cream white with red cheek; flesh white; freestone. A seedling of the Chinese Cling. New. N. C.
- Cooledge's Early Red Rareripe. See Cooledge's Favorite.
- Cooledge's Favorite, p. 479.
- Crawford's Early Melocoton, or Crawford's Early, p. 485.
- Crawford's Late Melocoton, p. 485.
- Crosby, p. 485.
- Crother's. Medium, roundish, white shaded crimson; flesh white, red at pit, tender, juicy, good. Late Southern variety.
- Cut-leaved. See Emperor of Russia.
- D'Abricot. See Yellow Admirable.
- Darby. Large, round, white with blue wash; flesh white to stone, juicy, sweet, good, cling. S. C.
- Deming's Orange. (Deming's September.) Large, oblong, yellow with red cheek; flesh yellow, red at stone, juicy, vinous, good. Late.
- Dixie. Medium, yellow white, red blush; flesh white, subacid, poor. Fla.
- Donahoo Cling, p. 488.
- Dorsetshire. See Nivette.
- Double Blossomed. Ornamental; fruit rather large, roundish, of poor quality.
- Double Flowering Peach. See Double Blossomed.
- Double Montagne. See Double Mountain.
- Double Mountain, p. 476.
- Dr. Berckman's. Large, creamy white, blushed with crimson, mottlings at base; flesh white, red at stone, juicy, vinous, good. Ga.
- Downing's Sweetwater. See Sweetwater Early.

Druid Hill, p. 479.

Duff Yellow. Large, yellow, red blush; flesh yellow, cling.

Dwarf Orleans, or Italian Dwarf.

Very small, trees dwarf—a curiosity.

Early Admirable, p. 479.

Early Anne, p. 476.

Early Beatrice. Small, roundish-oblong, deep red, handsome. Tree overbears and needs thinning to make fruit of any size. A week or more later than Amsden. English.

Early Chelmsford, p. 477.

Early Crawford. See Crawford's Early.

Early Louise. Medium, round, red, melting, soft, very good. Ripens immediately after Early Beatrice. English.

Early Malden. Medium, roundish, whitish and red; juicy, sprightly. August. C. W.

Early Melocoton. See Crawford's Early.

Early Newington. See Smith's Newington.

Early Newington Free, p. 483.

Early Purple, p. 483.

Early Red Nutmeg. See White Nutmeg.

Early Red Rareripe. See Red Rareripe.

Early Rivers. Large, roundish, nearly white, shaded with pink; soft, melting, rich, excellent. Closely follows Early Louise. English.

Early Royal George. See Royal George.

Early Silver. Large, roundish-ovate, light yellow with a

slight blush, melting and excellent. Early autumn. English.

Early Tillotson, p. 477.

Early White Nutmeg. See White Nutmeg.

Early York. See Large Early York.

Early York of Downing. See Serrate Early York.

Eaton's Golden. Medium, golden yellow, with few pink spots; flesh yellow, sweet, juicy, with an apricot flavor. A good canner. N. C.

Edgar's Late Melting. See Chancellor.

Edward's Late White. Large, roundish, white with a red cheek, handsome; sweet, juicy, excellent. Mid-autumn. Ala.

Elberta, p. 485.

Eliza. Medium, round, yellow and red. Late September. Phila.

Elmira Cling. Large, oval, white, downy; sweet, good.

Early August. Miss.

Emperor. Large, yellow, red cheek; flesh yellow, free. Seedling of Crawford's Late. New. N. J.

Emperor of Russia, p. 477.

Excelsior. See Crosby.

Everbearing. Medium, white vinous, juicy, no value for market. Good.

Favorite, p. 480.

Fay's Early Ann, p. 480.

Flater's St. John. Large, resembling Crawford, deep red; flesh yellow; good. Southern. Very early.

- Flat Peach of China. See Peen-to.
- Fleitas, or Yellow St. John. (May Beauty.) Large, roundish, orange yellow with a deep red cheek; flesh yellow; high flavored; a popular peach at the South.
- Fleweller's Cling. Large, round, dark red and yellowish-white; juicy, high flavored; clingstone. Early August.
- Foster, p. 485.
- Fox's Seedling, p. 480.
- Freeman. Large, round, yellow and red; flesh yellow. Late. Ill.
- Freestone Heath. See Kenrick's Heath.
- French Bourdine. See Late Admirable.
- French Magdalen. See Magdalen of Courson.
- French Mignonne. See Grosse Mignonne.
- French Royal George. See Bellegarde.
- Fruitland. Large, ovate, greenish-white; juicy, vinous. Southern, in September.
- Fulkerson, p. 477.
- Galande. See Bellegarde.
- Garfield. See Brigdon.
- General Lee. Medium to large, oblong, creamy white, crimson splashes; flesh whitish, melting, juicy, rich, cling.
- George the Fourth, p. 480.
- Globe. Very large, globular, yellow red cheek; free; flesh yellow, very firm, sweet and luscious. Good shipper. Ripens with Crawford's Late.
- Golden Dwarf (Van Buren's). Medium, golden yellow, red cheek; dwarf, four or five feet high. September. Southern —tender and poor North.
- Golden Mignonne. See Yellow Alberge.
- Goode's October. Large, white washed and veined red; flesh white with red veins, juicy, vinous. Ga.
- Gorgas, p. 477.
- Governor Garland. See Alexander.
- Grand Admirable. Very large, yellowish-white; flesh white, red at stone; very good.
- Green Catharine, p. 480.
- Green Nutmeg. See Early Anne.
- Greenboro. Medium, red, shaded yellow; flesh white, juicy, good. Early.
- Griffin's Mignonne. See Royal George.
- Griffiths. See Susquehanna.
- Grimwood's Royal George. See Grosse Mignonne.
- Grosse Mignonne, p. 480.
- Haines' Early Red, p. 480.
- Hale's Early, p. 480.
- Hastings' Rareripe, p. 480.
- Hâtive de Ferrières. Medium, roundish, white, and rich red; juicy, sweet, rich, vinous; freestone. French.
- Hawkins' Winter. Large, freestone. Ripens in November in Va.
- Heath, p. 489.
- Heiley. (Early Belle.) Large, white, red cheek. Early. Ga. New.
- Henrietta. (Levy's Late). Very

- large, yellow, nearly covered with bright crimson; clingstone. A very handsome fruit. Hardy, prolific. Late. Henry Clay, p. 484.
- Hill. See Sweet Hill.
- Hill's Chili, p. 487.
- Hoffman's Pound. See Morrisania Pound.
- Honest John. See Large Early York.
- Honey. Medium, oblong, pointed, white, mottled carmine; flesh very sweet. Tree vigorous and prolific, allied to the Peen-to.
- Honeywell. Medium, round, greenish-white, washed red; flesh whitish, juicy, sweet, good. Pit nearly free.
- Horton's Delicious. Large, roundish-oval; creamy white and faint red; flesh wholly white, excellent; clingstone. October. Ga.
- Hovey's Cambridge Belle. See Cambridge Belle.
- Hull's Athenian. Very large, oblong, downy, dull red on yellowish-white; rich, vinous. October. Ga.
- Hyslop, p. 489.
- Incomparable. Large, roundish, light red on yellowish-white; juicy, melting; moderately good; clingstone. September.
- Indian Blood. Clingstone; large, purple red, veined red, downy; flesh dark red, juicy, vinous.
- Italian. See Malta.
- Jackson Cling. Large, oblong, pointed, dark yellow and dark red; firm, red at stone; juicy, rich; excellent. Late August. Ga.
- Jane. Large, roundish-oblate, red on greenish-yellow; excellent. Late September. Phila.
- Japan Dwarf Blood. Medium, yellow and crimson; flesh white, striated red, juicy. Tree dwarf. Claimed to be earliest of all. New.
- Jaques' Rareripe, p. 486.
- Java Peach. See Flat Peach of China.
- Jones' Early, p. 480.
- Jones' Large Early, p. 484.
- Judd's Melting. See Late Admirable.
- Kennedy's Cling, or Carolina. See Lemon Cling.
- Kenrick's Heath, p. 484.
- Keyport White. Large, pure white, free from stone; vigorous, productive, and valuable. N. J.
- Lady Ann Steward. See Morris White.
- Lady Ingold. Medium, red on yellow; flesh yellow, sweet, rich. Ripens one week earlier than Crawford's Early. New. N. C.
- Lady Parham, p. 484.
- La Grange, p. 484.
- La Royal. See Late Admirable.
- Large American Nutmeg. See Early Sweetwater.
- Large Early York, p. 481.
- Large French Mignonne. See Grosse Mignonne.
- Large Newington. See Old Newington.

- Large Red. See Red Rareriipe.
 Large Violet. See Bellegarde.
 Large White Cling, p. 488.
 Large Yellow Rareriipe. See Yellow Rareriipe.
 Large Admirable, p. 481.
 Late Rareriipe, p. 481.
 Late Yellow Alberge, October Yellow, or Algiers Winter. Medium, roundish, greenish-yellow; downy, clingstone; rather sweet. Only for preserving. Of little value.
 Lemon. See Tuskena.
 Lemon Cling, p. 489.
 Leopold I. Large, roundish, yellow and red; melting, juicy. Rather late. Belgian.
 Levy's Late. See Henrietta.
 Lincoln, p. 486.
 Long Yellow Pineapple. See Lemon Cling.
 Lord Palmerston. Very large, creamy white with a blush; very good. New. Late.
 Lorentz. Medium, yellow, red cheek; flesh yellow, freestone. Prolific, hardy.
 Lovett's White. Large, white, in distinct suture; flesh white to pit, solid, sweet, freestone. Hardy, prolific. New.
 Madeleine Rouge. See Magdalen of Courson.
 Madeline de Courson. See Magdalen of Courson.
 Magdala. Medium, round oval, yellow white, marbled crimson; flesh greenish-white, melting, rich, free.
 Magdalen of Courson. Medium, round, sutured, skin white, red cheek, flesh white, slightly red at stone, juicy, rich. French, little known in U. S. Malta, p. 477.
 Mammoth. See Early Chelmsford.
 Marshall's Late. Large, orange yellow, red blush, freestone; good.
 Mary's Choice. A very productive New Jersey peach; requires thinning and high culture.
 Mellish's Favorite. See Noblesse.
 Melocoton. See Crawford's Late.
 Merriam, p. 486.
 Mignonne. See Grosse Mignonne.
 Molden's White. Large oblong, whitish; flesh wholly white; juicy, sweet, excellent. Late September.
 Monstrous Pavie. See Pavie de Pomponne.
 Montgomery's Late, p. 484.
 Moore's Favorite, p. 481.
 Moore's June. Rather small, round, yellowish and red; juicy, vinous; good. Ga. Late June.
 Morris' Red, p. 481.
 Morris White, p. 484.
 Morrisania Pound, p. 481.
 Motteux. See Late Admirable.
 Mountain Rose, p. 478.
 Mrs. Brett. Large, round, handsomely marked with red on a white skin; melting, rich, excellent. Season medium.
 Mrs. Poinsette, p. 486.
 Muir, p. 486.
 Muscoga. Large, yellow, nearly covered crimson and brown; flesh white, red veins at stone,

- juicy, rich. A variety of Columbia.
- Musser. See Alexander.
- Narbonne. See Late Admirable.
- Neil's Early Purple. See Grosse Mignonne.
- New Cut-Leaved. See Emperor of Russia.
- Newington. See Old Newington.
- New York Rareripec, p. 481.
- New York White Clingstone. See Large White Cling.
- Nivette, p. 481.
- Nix's Late White. Large, roundish-oblong, white with a light red cheek; flesh white, adhering to the stone; sweet, rich. Late in October. Ga.
- Noblesse, p. 420.
- Noisette. See Chancellor.
- Nutmeg. Red. Very small, roundish, pointed, yellow and red; flesh yellowish-white; flavor moderate. Late July.
- Nutmeg, White. Very small, roundish-oval, whitish; flesh wholly white; mild, pleasant. Late July.
- Oldmixon Cling, p. 488.
- Oldmixon Free, p. 487.
- Old Newington, p. 488.
- Orange Cling, p. 489.
- Orange Free. Medium, round, yellow mottled red; flesh yellow, juicy, very sweet; free-stone. New.
- Owen. Large, roundish, yellow and dark red; flesh yellow; juicy, delicious. Late September. Mass.
- Owen's Lemon Rareripec. See Owen.
- Pallas. Large, round, whitish with crimson; flesh white, melting, vinous. Ga.
- Pavie Admirable. See Incomparable.
- Pavie de Pomponc, p. 489.
- Pavie Monstreux. See Pavie de Pomponc.
- Peen-to. (Flat Peach of China.) Small, very oblate, deeply indented to the stone at base and apex; greenish-white, mottled red; flesh juicy, good; cling. Does well in the South.
- Peeble's May Cling. See Sneed.
- Picquet's Late. Quite large, round, yellow and red; flesh yellow, melting, rich; very good. Southern. September.
- Pineapple Cling. See Lemon Cling.
- Poole's Large Yellow, p. 486.
- Poole's Late Yellow Freestone. See Poole's Large Yellow.
- Pourprée Hâtive. See Early Purple.
- Pourprée Hâtive à Grandes Fleurs. See Early Purple.
- President, p. 482.
- President Church, p. 484.
- Preston Cling. Large, cream yellow, red cheek; flesh light yellow, juicy, good. N. C.
- Prince's Climax. Large, oval, yellow and red; rich, aromatic; clingstone. Late September. L. I.
- Prince's Excelsior. Very large, round, bright orange; flesh wholly yellow; rich, aromatic. October. L. I.
- Prince's Paragon. Large, oval, yellowish-green and red; juicy, rich. September.

- Prince's Red Rareripe. See Prince's Paragon.
 Princess of Wales. Large, round, cream yellow, pink about stem; flesh white, slightly red at pit; freestone; juicy, tender, rich.
 Purple Alberge. See Yellow Alberge.
 Quality. Medium, round, white splashed crimson; flesh cream white, red at pit, tender, juicy, vinous, very good. Md.
 Red Alberge. See Yellow ditto.
 Red Avant. See Nutmeg, Red.
 Red Celon. Small, oval, greenish-white, blood-red around pit; free, acid, poor.
 Red Cheek Melocoton, p. 486.
 Red Cling. See Rodman's Cling.
 Red Heath. See Heath.
 Red Magdalen. See Magdalen of Courson.
 Red Rareripe, p. 478.
 Reeves' Favorite, p. 486.
 Richmond. Medium, round, yellow, with red cheek; flesh yellow; melting, very good. Late. Lyons, N. Y.
 Robena. Large, roundish, yellow shaded red; flesh deep yellow, red at pit, juicy, melting, mild, sub-acid, good. D. C.
 Rodman's Cling, p. 489.
 Ronald's Mignonne. See Bellegarde.
 Rose. See Strawberry.
 Rosebank. Large, round, red on greenish-white; juicy, rich; very good. Late August. C. W.
 Royal Charlotte, p. 478.
 Royal George, p. 478.
 Royal Kensington. See Grosse Mignonne.
 Royale. See Late Admirable.
 Salway, p. 486.
 Saunders'. See Alexander.
 Schumaker. Large, round, crimson. Very early.
 Scott's Early Red, p. 482.
 Scott's Magnate, p. 484.
 Scott's Nectar, p. 482.
 Scott's Nonpareil, p. 486.
 Selby's Cling. See Large White Cling.
 Serrated. See Emperor of Russia.
 Shanghae, p. 489.
 Sim's November. Large, greenish-white, dull red cheek; poor. Late.
 Smith's Favorite, p. 487.
 Smith's Newington, p. 487.
 Smock Free, p. 487.
 Smooth-Leaved Royal George. See Bellegarde.
 Sneed. (Peeble's May Cling.) Medium, oval, yellow white, red blush; flesh white, tender. Claimed to be very early. New seedling of Chinese Cling.
 Snow, p. 484.
 Steadly. Large, whitish with a slight blush. Ripens a few days after Heath Cling.
 Strawberry, p. 484.
 Stetson's Seedling, p. 482.
 Stevens' Rareripe, p. 478.
 Stump, p. 482.
 Sturtevant. Resembles Bergen's Yellow, slightly larger; hardy, vigorous, productive. New.
 Summer Snow. Medium, white;

- flesh white to pit, sweet, cling.
A good preserving peach.
- Surpasse Melocoton. Large, roundish-oval; yellow with a red cheek; flesh nearly white; rich, excellent. Early autumn. Productive. Rochester, N. Y.
- Susquehanna, p. 487.
- Sweetwater, p. 478.
- Sweetwaier, Early, p. 482.
- Thurber. Large, roundish-obl-ate, creamy white marbled with crimson; juicy, melting, rich; freestone. Ripens in July in Georgia.
- Tippecanoe, p. 490.
- Titus. Large, roundish, yellow and red; juicy, rich; excellent. Late September. Phila.
- Triumph, p. 487.
- Troth's Early, p. 482.
- True Red Magdalen. See Red Magdalen.
- Tuft's Rareripe, p. 486.
- Tuskena. (Tuscan, Tustin.) Large, oblong, yellow, deep red cheek; cling; hardy. Strong grower. Miss.
- Unique. See Emperor of Russia.
- Van Buren's Golden Dwarf. Medium, ovate, yellow; clingstone; quality poor. Southern. Tree small or dwarf; tender and valueless at the North.
- Vanguard. See Noblesse.
- Van Zandt, p. 482.
- Waddell. Medium, skin greenish-white, covered red, flesh white, juicy, prolific. New. Ga.
- Wager. Medium, long oval, yellow, firm; early autumn. Drying and canning.
- Walburton Admirable, p. 478.
- Waldo. Medium. Hybrid of Peen-to and Honey.
- Walter's Early, p. 482.
- Ward's Late Free, p. 482.
- Washington, p. 424.
- Washington Cling, p. 490.
- Washington Red Free. See Washington, p. 482.
- Waterloo. See Alexander.
- Wheatland. Large, roundish, golden yellow with a crimson cheek; juicy, very good, productive. Ripens after Crawford's Early.
- White Avant. See White Nutmeg.
- White-Blossomed Incomparable. Large, oval, white; flesh white; juicy, pleasant. September.
- White Imperial, p. 483.
- White Melocoton. See Morris White.
- White Rareripe. See Morris White.
- Wilder. See Alexander.
- Wonderful. Large, globular, yellow covered with carmine; flesh yellow, red at pit, rich; freestone. Tree vigorous and productive. Late. New.
- Yellow Admirable, p. 487.
- Yellow Alberge, p. 486.
- Yellow St. John's, p. 487.
- Yellow Pineapple. See Lemon Clingstone.
- Yellow Rareripe, p. 487.

PEARS.

- Abbé Edouard. Medium, obovate, bright green becoming yellow; juicy, half-melting, agreeable. November. Belgian.
- Abbott, p. 525.
- Adams, p. 515.
- Adelaide de Rêves. Medium, roundish, green becoming yellow; very juicy, melting, rich, vinous. October. Belgian.
- Adele de St. Denis. See Baronne de Mello.
- Albret. Medium, long pyriform, yellow, russeted, very juicy, buttery and melting, rich; very good. October.
- Alençon, p. 541.
- Alexander. Medium, oblong obovate, greenish and russet; juicy, melting, rich, very good. October. N. Y.
- Alexandre Lambre, p. 541.
- Alexandrina. Medium, roundish, obovate, yellow, with a red cheek; melting, rich; very good. September.
- Alice Payne. Medium, yellow white. Winter. N. C.
- Almond Pear. See Beurré Amandé.
- Alpha, p. 515.
- Alphonse Karr. See Soldat Laboureur.
- Althorpe Crassane. Medium, roundish-ovate, pale green; juicy, not rich. October.
- Amadotte. Large, pyriform; coarse; juicy, often astringent and worthless. October.
- Amalis, p. 525.
- Amandé. Medium, long pyriform, dull green, rough; buttery, juicy; very good. September. Belgian.
- Amanlis. See Amalis.
- Ambrosia. Medium, roundish, obovate; buttery, without much flavor. September. French.
- Amiré Joannet. Small, short pyriform, greenish-yellow, crimson dotted; becoming mealy. Middle of July. Worthless and superseded.
- Amory. See Andrews.
- Ananas. See Henry IV.
- Ananas de Courtral. See Ananas d'Été.
- Ananas d'Été, p. 515.
- Andre Desportes. Medium, obovate pyriform, pale green, juicy and melting. Summer. France.
- Andrews, p. 515.
- Angel. Large, handsome, early, poor. Ghent, N. Y.
- Angora. See Pound.
- Angouleme, p. 515.
- Angleterre. Medium, pyriform, dull green; juicy, melting, pleasant, not rich. September.
- Anjou, p. 525.
- Arbre Courbre. Medium, pyriform, greenish; coarse; half-melting, astringent. September.
- Aremberg, p. 537.
- Assomption. Large, irregular pyriform, yellow, reddened toward the sun; juicy and melting; partly coarse; of moder-

- ate quality. Tree vigorous and productive. August. French.
- Aston Town. Small, roundish, yellow; rather sweet. September.
- Audusson. See Ridelle's.
- Auguste de Maraise. Large pyriform, rough brown; but-tery, juicy, sweet. October. Belgian.
- Auguste Royer, p. 525.
- Augustus Dana, p. 525.
- Autumn Colmar, or Colmar d'Été. Conic, greenish-yellow; coarse; juicy, astringent; rots. September. [Another Autumn Colmar is medium, pyriform, green; rich, agreeable. Oc-tober.]
- Autumn Paradise, p. 516.
- Bachelier, p. 516.
- Bankerbine. Medium, obovate, greenish-yellow; coarse, breaking. October.
- Baronne de Mello, p. 516.
- Barry, p. 537.
- Bartlett, p. 510.
- Bartram. Medium, obovate pyriform, pale yellow; juicy, melt-ing, excellent. September. Phila.
- Bavey, p. 526.
- Beadnell. Medium, turbinate, yellowish-green and red; juicy, melting. September.
- Beauchamps. See Bergamotte Cadette.
- Beaufort. Medium, russeted yellow. Winter. N. C.
- Beaulieu. Medium, roundish-conic, greenish-yellow and russet; rather coarse; but-tery, melting, vinous. Octo-ber.
- Beaumont. See Vaet.
- Beau Present d'Artois. Large, pyriform, yellow; granular, sweet; rots at core. Septem-ber.
- Belle Angevine. See Pound.
- Belle de Bruxelles, or Belle d'Août. Large, pyriform, yel-low; sweet, poor. A hand-some, worthless sort.
- Belle de Flandres. See Flemish Beauty.
- Belle de Noël; or, Belle Après Noël. See Fondante de Noël.
- Belle Épine Dumas. See Dumas.
- Belle et Bonne. Large, round-ish, greenish; rather coarse; buttery, sweet. September. Belgian.
- Belle Fondante. Medium, conic turbinate, yellow russet; but-tery, juicy, rich, slightly as-tringent. October.
- Belle Julie. Small, obovate, light green; melting, buttery, sweet, perfumed. October.
- Belle Lucrative, p. 525.
- Belle Williams. Large, pyriform, greenish-yellow; buttery, melt-ing; very good—has cracked badly at some places. Winter.
- Bellissime d'Été. See French Jargonelle.
- Bellissime Jargonelle. See French Jargonelle.
- Belmont. Medium, roundish-obovate, yellow green; coarse; juicy, sweet. October. An English cooking-pear.
- Bennert. Small, melting. Mid-winter; hardy. Belgian.
- Benoist. Medium, turbinate;

- yellow with a red cheek; melting, sweet, agreeable. August.
- Bergamot, Easter. Medium, roundish-obovate, pale green; crisp, juicy, pleasant. Late winter.
- Bergamot, Gansel's, p. 535.
- Bergamot, Hampden's. Large, roundish, yellow; a little coarse; breaking and buttery, if house-ripened. September.
- Bergamot, Summer. Small, round, yellowish-green; juicy, rich, becoming mealy. Late July.
- Bergamotte Cadette, p. 525.
- Bergamotte de la Pentecôte. See Easter Beurré.
- Bergamotte de Millepieds. Medium, roundish, dark green; melting, juicy; very good. September. French.
- Bergamotte de Soulers. See De Sorlus.
- Bergamotte d'Esperen. Medium, flattened pyriform, green, rough; sweet, rich, juicy, spicy. December to February. French.
- Bergamotte d'Été. See Hampden's Bergamot.
- Bergamotte d'Hollande. Rather large, roundish, green and russet, becoming yellow; crisp, juicy, agreeable. Through winter till spring.
- Bergamotte Gaudry. Medium, roundish, yellowish-green, coarsely dotted; very juicy, mild sub-acid.
- Bergamotte Heimbourg. Large, roundish, rough, green becoming yellow; buttery, juicy, rich, perfumed. October. French.
- Bergamotte Leseble. Medium, oblate, yellow, partly russeted; juicy, sweet, melting, perfumed. October.
- Bergamotte Suisse. Medium, roundish, pale green, yellow and pale red; melting, sweet, pleasant. October.
- Bergen, p. 517.
- Berkmans, p. 526.
- Berriays. Medium, obovate, pyriform, pale greenish-yellow; juicy, sweet; very good. September. French.
- Bessemianka. Medium, pyriform; flesh tender, buttery, juicy, sub-acid; good. Russian.
- Beymont, p. 526.
- Bieumont. See Beymont.
- Bijou. Medium, yellow, red cheek. August.
- Bilboa. See Golden Beurré of Bilboa.
- Bishop's Thumb. Rather large, conic oblong, yellowish-green, with a russet cheek; juicy, melting, vinous, slightly astringent. October. English.
- Black Worcester, p. 537.
- Blanc. See White Doyenne.
- Bleeker's Meadow. Small, roundish, yellow; flesh white, firm, musky, sometimes soft, but mostly remaining hard. October. Pa. Very productive, and valuable for cooking.
- Bloodgood, p. 513.
- Bolwiller. A baking-pear—not valuable.
- Bon Chrétien, Flemish. Medium, obovate, pale green and

- brown; crisp, juicy; stews tender. Winter.
- Bon Chrétien Fondante, p. 526.
- Bon Chrétien, Spanish. Large, pyriform, deep yellow and red; half breaking—cooking.
- Bon Gustave. Medium, pyriform, greenish and russet; but-tery, juicy, perfumed. December. Belgian.
- Bonne Charlotte. Medium, mostly obovate; buttery, rich, perfumed. August.
- Bonne d'Ezee. Large, pyriform, yellowish-green, with some russet; juicy, melting, rich; very good. September, October. Often cracks badly.
- Bonne de Malines. See Winter Nelis.
- Bonne du Puits Ansault. Rather small, roundish-oblate, greenish-yellow; juicy, melting, rich; very good. September. Great bearer. French. New.
- Bonne Rouge. See Gansel's Bergamot.
- Bonne Sophia. Medium, obovate pyriform, acute, greenish-yellow and red cheek; melting, sweet; very good. October.
- Bosc, p. 517.
- Boston. See Pinneo.
- Boucquia. Rather large, oval turbinate, pale yellow; rots at core; rather astringent. October. Flemish.
- Bourgemester. Large, pyriform, light yellow; juicy, astringent. November. Tree cankers badly.
- Boussock, p. 526.
- Brabant. See Soldat Labreur.
- Brande's St. Germain, p. 541.
- Brandywine, p. 511.
- Bretonneau. Large long pyriform, variable, rough, yellow with a brown cheek; half-melting, not juicy, rich, vinous, perfumed. Late winter. Belgian.
- Brialmont. Resembles Urbaniste in the character of the tree and fruit; of good promise. October. Belgian.
- Brignais. See Des Normes.
- Brocas Bergamot. See Gansel's Bergamot.
- Broom Park. Medium, roundish, greenish-yellow and dull red; coarse; juicy, sweet. January, February. English.
- Brougham. Roundish-oblate, greenish-yellow; coarse; astringent. November. English.
- Brown Beurré, p. 527.
- B. S. Fox, p. 526.
- Buffum, p. 527.
- Burlingame. Medium, oblate, yellow; coarse; poor. September. Ohio.
- Burnett. Large, obtuse pyriform, pale yellow; coarse; juicy, sweet; good. October. Mass.
- Burnicq. Medium, turbinate pyriform, rough, russeted; flesh greenish-white; juicy, rich, perfumed. Late October. Belgian.
- Butter Pear. See White Doyenné.
- Cabot, p. 527.
- Caen de France. Rather large, pyriform, yellow and russet; half melting, juicy, sweet, slightly astringent. Winter.

- Caissoy d'Hiver. Medium, obovate, yellow, rough, russeted; buttery, rich, high-flavored. Winter.
- Calebasse. Medium, long pyriform, irregular, dull yellow, rough; coarse; juicy, crisp, rich, pleasant. September. Belgian.
- Calebasse Bosc. See Bosc.
- Calebasse Delvigne. Medium, pyriform, yellow; coarse; buttery, rich, perfumed, slightly astringent. October.
- Calebasse d'Été. Medium, long pyriform, bright yellowish-brown; astringent, poor. September. Belgian.
- Calebasse d'Octobre. Large, pyriform, pale yellow, juicy, melting, of moderate quality. October. Belgian.
- Calhoun. Medium, roundish, irregular, yellowish and dull-red; coarse, melting, rich, vinous, perfumed. October. Conn.
- Cambridge Sugar Pear. See Harvard.
- Camerlyn. Medium, pyriform, yellow; melting, rich, aromatic. October. Belgian.
- Canandaigua, p. 517.
- Canning Seigneur d'Hiver. See Easter Beurré.
- Capiaumont, p. 517.
- Capsheaf, p. 527.
- Capucin. Medium, oval, yellow with a blush; crisp, juicy, rich, good. October. Belgian.
- Cassante de Mars. Obovate, yellow; juicy, rich, vinous, perfumed. Winter. Belgian.
- Catherine Gardette. Rather large, roundish-obovate, yellow, dotted red; buttery, coarse, sweet, good. September. Phila.
- Catherine Lambre. Medium, obovate pyriform, greenish-yellow; juicy and melting, sweet; very good. October. Belgian.
- Catillac, p. 537.
- Catinka. Rather small, obovate pyriform, pale yellow; coarse; buttery, juicy, vinous. November. Belgian.
- Chancellor, p. 517.
- Chaptal. Rather large, pyriform, greenish-yellow; half buttery, half hard; tolerably good, rather insipid. February.
- Charles Frederick. Green becoming yellow; melting, juicy, vinous, perfumed; very good. October. Belgian.
- Charles of Austria. Large, roundish, greenish-yellow; juicy, astringent. October. Belgian.
- Charles Smet. Medium, pyriform, yellow and russet; juicy, sweet, perfumed. January. Belgian.
- Charles Van Hooghten. Large, pyriform, dull yellow; buttery, melting, rather sweet. October.
- Charlotte de Brower. Rather large, roundish-oval, rich yellow; juicy, rich, vinous, perfumed. October. Belgian.
- Charneuse. See Duc de Brabant.
- Chaumontel, p. 537.

- Chaumontel très gros. See Easter Beurré.
- Chelmsford. Large, pyramidal, yellow with a red cheek; flesh coarse; sweet—good for cooking. September.
- Chinese Sand Pear. See Sand.
- Church, p. 534.
- Citron. Small, roundish, greenish; coarse; juicy, vinous, musky. August, September. Conn.
- Citron. (Beurré Citron.) Medium, obovate, green becoming yellow; juicy, sub-acid. February, March. Belgian.
- Citron des Carmes. See Madeleine.
- Clairgeau, p. 538.
- Clapp's Favorite, p. 511.
- Clara. Medium, oval, pyriform, yellow, dotted red; melting, juicy, sweet, faintly acid. Belgian.
- Clay. Medium, obovate, yellow; coarse; juicy, rich, perfumed. October. Conn.
- Clinton. Large, yellow; buttery, not rich. November. Belgian.
- Clion. See Vicar of Winkfield.
- Coffin's Virgalieu. Rather large; sweet, juicy, not rich. December.
- Coit's Beurré. Medium, obovate pyriform, yellow with some russet, crimson, dotted; granular; buttery, rich, vinous. September.
- Collins, p. 527.
- Colmar, p. 538.
- Colmar, Beurré. Medium, oval, pale green, becoming yellow; flesh white; juicy, melting, perfumed. October. Belgian.
- Colmar Bonnet. Medium, conic obovate, pale yellow; buttery, mild, slightly perfumed. Good. November.
- Colmar Bosc. See Niell.
- Colmar d'Alost. Large, long pyriform, sometimes obovate, greenish-yellow and red; flesh buttery, juicy, slightly astringent. October. Belgian.
- Colmar d'Aremberg. Large, turbinate pyriform, greenish-yellow; quality poor. November.
- Colmar d'Été. Conic, greenish-yellow; coarse; juicy, astringent; rots at core. September.
- Colmar d'Hiver. See Glout Morceau.
- Colmar Épine. Large, roundish-oblong, greenish-yellow; flesh sweet, melting; good; agreeable. September. Belgian.
- Colmar Gris. See Colmar.
- Colmar Hardenpont. See Colmar.
- Colmar Niell. Large, obovate, pale yellow; buttery, melting. Good. October.
- Colmar Souverain. See Colmar.
- Colonel Wilder. Above medium, obovate pyriform, yellow with some russet, juicy, melting, sweet. Early winter. Origin, Cal.
- Columbia, p. 541.
- Columbian Virgalieu. See Columbia.
- Comice, p. 517.
- Comice de Toulon. Large, oblong obovate, yellow; juicy, melting. November.
- Commodore. Medium, obovate, yellow; buttery, melting,

- sweet; good. November. Belgian.
- Comprette. Small, obtuse pyriform, yellowish-green; buttery, rich, perfumed. October. Flemish.
- Comstock. Medium, obovate, yellow and red; crisp, sweet, sprightly. November.
- Comte de Flandre, p. 517.
- Comte de Lamy, p. 527.
- Comte de Paris, p. 517.
- Comte Lelieur. Medium, turbinate, yellowish-green and brown; melting, sweet, high-flavored. September. Belgian.
- Comtesse d'Alost. See Colmar d'Alost.
- Conseiller de la Cour, p. 517.
- Conseiller Ranwez. Large, oblate, irregular, green, rough; coarse; juicy, perfumed, vinous, slightly astringent. October.
- Cooke. Rather large, pyramidal, irregular, pale yellow; juicy, buttery, rich, vinous. October. Va.
- Copia. Large, yellow; coarse; rich. October. Phila.
- Cornelis, or Desirée Cornelis. Large, obovate pyriform, greenish-yellow; melting, buttery, sweet, perfumed. August, September.
- Coter, p. 542.
- Count Coloma. See Urbaniste.
- Countess of Lunay, p. 518.
- Crassane. Medium, roundish, greenish-yellow; juicy, sweet, moderately pleasant. October.
- Crassane d'Hiver. Medium, half melting, high-flavored. Winter.
- Crawford. Medium, obovate, light yellow; flesh buttery, sweet, moderately pleasant. August. Scotch.
- Crisco. Medium; resembles Seckel, of which it is a seedling. N. C.
- Croft Castle. Medium, roundish, greenish-yellow; juicy, crisp, sweet. October. English.
- Cross, p. 544.
- Cumberland. Rather large, obovate, orange yellow; buttery, moderately juicy. October. R. I.
- Cushing, p. 527.
- Dallas, p. 527.
- Dana's Hovey, p. 542.
- Davis. Small, roundish, variable, russeted; buttery, gritty at core; vinous; good. October. Pa.
- Dean's. See White Doyenné.
- Dearborn's Seedling, p. 513.
- De Bavay. Rather large, pyriform, yellow; juicy, melting, vinous. October. Belgian.
- Defais, p. 528.
- Delices de Charles. Medium, pyramidal, yellowish-green; juicy, melting, vinous—like Brown Beurré. December. Belgian.
- Delices d'Hardenpont of Angers, p. 528.
- Delices d'Hardenpont of Belgium. Large, conic pyriform, greenish-yellow, rough; buttery, melting, juicy, sweet, rich, aromatic. November, December. Belgian.

- Delices de Jodoigne. Rather large, yellowish-green; half melting, rich, very good. October.
- Delices Van Mons. See Vicomte de Spoelberch.
- De Louvain. Medium, obovate pyriform, light yellow; buttery, melting, rich, perfumed, excellent. October. Belgian.
- Democrat. Medium, greenish-yellow. Late August. A strong grower. Pa.
- Des Nonnes, p. 534.
- De Sorlus. Large, ovate, pyriform, light green becoming yellow; juicy; melting, pleasant, deficient in flavor. Early Winter.
- De Spoelberg. See Vicomte de Spoelberch.
- De Tongres, p. 518.
- Deux Sœurs. Large, long pyriform, green; juicy, coarse, with an almond flavor. November. Belgian.
- Diel, p. 518.
- Diel's Butter, See Diel.
- Dikeman. Medium, oblate, yellow; juicy, melting, rich, vinous, perfumed. October. Conn.
- Dillen, p. 528.
- Diller. Rather small, round, yellowish; granular; juicy, sweet, perfumed. Early September.
- Directeur Alphande. Very large, greenish-yellow, russet dots; flesh fine-grained, sugary, rich. Ripens in late winter.
- Dix, p. 518.
- Docteur Bouvier. Large, long pyriform, light green, a little russet; juicy, half melting, agreeable, vinous. February. Belgian.
- Docteur Capron. Medium, obovate, greenish-yellow, partly russeted; melting, pleasant, sprightly. October. Belgian.
- Docteur Lentier. Medium, pyriform, greenish-yellow; buttery, juicy, perfumed, good. November.
- Docteur Troussseau. Large, obovate, green dotted red; buttery, juicy, rich. November, December. Belgian.
- Doctor Reeder. Small, roundish-ovate, yellow, netted with russet; melting, buttery, sugary, perfumed. Very good. November. Good bearer. Seneca County, N. Y.
- Double Philippe. See Boussock.
- Douillard. Rather large, turbinate; juicy, melting, perfumed. Very good.
- Dow. Medium, obovate, pyriform or conic, yellowish-green, rough, partly russeted; juicy, melting, vinous, sometimes astringent. September, October. Conn.
- Dowlin. See Uwchlan.
- Downing, p. 528.
- Doyenné d' Hiver. See Easter Beurré.
- Doyenné d'Été. See Summer Doyenne.
- Doyenné Rouge. See Gray Doyenné.
- Duc d'Aumâle. See Gedeon Paridant.
- Duc de Bordeaux. See Dumas.
- Duc de Brabant, p. 519.

- Duchesse. See Angoulême.
- Duchesse d'Alost. See Colmar d'Alost.
- Duchesse de Berri d'Été, p. 515.
- Duchesse d'Orleans, p. 519.
- Duchesse Helene, p. 528.
- Duhamel du Monceau. Large, long pyriform, light yellow, partly russeted; flesh melting, juicy, excellent. Early winter. French.
- Duhaume. Medium, oblate, rough, with some russet; coarse; buttery, melting, vinous. Winter.
- Dumas, p. 519.
- Dumortier, p. 528.
- Dundas, p. 528.
- Dunmore, p. 528.
- Dupuy Charles. Medium, conic pyriform, yellow, rough, russeted; melting, juicy, rich, good. November. Belgian.
- Durandean. See De Tongres.
- Duval, p. 519.
- Early Catharine. See Early Rousselet.
- Early Rousselet. Rather small, pyriform, yellow and brownish-red; sweet, pleasant, perfumed; rots at core. August.
- Easter Beurré, p. 542.
- Eastern Belle. Medium, obovate pyriform, yellow, some russet; sweet, rich, musky; very good. September. Maine.
- Eastnor Castle. Medium, roundish, green; juicy, melting. December.
- Echassery. Medium, roundish-oval, greenish-yellow; melting, buttery, sweet. Winter. French.
- Edmonds, p. 528.
- Edwards. Medium, round, yellow; granular—baking. Conn.
- Edwards' Henrietta, p. 454.
- Elberg. Large, obtuse pyriform, pale yellow; rather coarse, juicy, sweet, perfumed. November. Belgian.
- Elizabeth, Edwards'. Medium, obtuse pyriform, angular, greenish-yellow; buttery, subacid; good. October. Conn.
- Elizabeth, Manning's, p. 455.
- Ellis. Rather large, pyriform, yellowish-green; juicy, melting, vinous. Early October. Mass.
- Emerald. Medium, obovate, green; melting, buttery, sweet. December. Belgian.
- Emile Bivort. Medium, conic oblate, orange yellow and russet; juicy, rich, vinous. November.
- Emile d'Heyst, p. 519.
- Enfant Prodigue. Rather small, pyriform, green, rough, russeted; granular, juicy, vinous, perfumed. October. Belgian.
- English Bergamot. See Autumn Bergamot.
- Épine d'Été. (Summer Thorn.) Medium, pyriform, greenish-yellow; melting, sweet, musky. Early September.
- Episcopal. See Fortunée.
- Esperen. Large, long pyriform, dull yellow and russet; juicy, vinous. October. Belgian.
- Esperione. Medium, obovate, slightly pyriform, yellow; juicy, melting, perfumed. September.
- Eugene Appert. Medium, round-

- ish, rough, brownish-yellow; melting, sweet, perfumed, excellent.
- Excellentissima. See Duc de Brabant.
- Eyewood. Medium, oblate, dull yellow with some russet; but-tery, good. English.
- Feaster. See Bleeker's Meadow.
- Ferdinand de Meester. See Rousselet de Meester.
- Figue, p. 519.
- Figue d'Alençon, p. 519.
- Figue de Naples, p. 528.
- Fine Gold of Summer. Small, roundish, yellow with a red cheek; juicy, good, not rich. August.
- Fin Or d'Hiver. See Franc Real d'Hiver.
- Fitzwater. Medium, yellow, red cheek; flesh juicy, melting. December.
- Flemish Beauty, p. 529.
- Fleur de Neige. (Snow Flower.) Rather large, conic pyriform, yellowish-green; granular; sweet, high-flavored. October. Belgian.
- Florimond Parent. Very large, pyramidal pyriform, tapering to crown, green becoming deep yellow; coarse; melting, rich, perfumed. September. Belgian.
- Fondante Agréable. Medium, roundish-obovate, yellowish-green; juicy, melting, refreshing. August.
- Fondante d'Automne. See Belle Lucrative.
- Fondante de Malines, p. 529.
- Fondante de Noël, p. 538.
- Fondante des Charneuse. See Duc de Brabant.
- Fondante des Pres. Medium, obovate pyriform, yellow; melting, juicy, sweet, aromatic. October. Belgian.
- Fondante du Comice. Large pyramidal (small specimens obovate), yellow; buttery, juicy, rich, vinous. October, November. French.
- Fondante Van Mons. Rather small, roundish, pale yellow; juicy, melting, sweet, agreeable. November.
- Fontenay. See Beurré Gris d'Hiver.
- Fontenay Jalousie. See Jalousie de Fontenay Vendée.
- Foote's Seckel. Small, obovate, yellow and brownish-red, and russet; juicy, melting, vinous; very good. September. Mass.
- Forelle, p. 519.
- Forme de Delices. Medium, obovate, yellowish, rough; buttery, rather dry, sweet. October. Flemish.
- Fortunée. Rather small, roundish, russeted; juicy, sprightly—cooking. Winter.
- Foster's St. Michael. Medium, roundish-obovate, yellow; coarse; astringent. September.
- Fougière. Medium, obovate, greenish-yellow; granular, sweet; good. October.
- Franc Real d'Été. See Summer Franc Real.
- Franc Real d'Hiver. Medium, roundish, yellow and brown; crisp—cooking. Winter.
- Frankford. See Bleeker's Meadow.

- Frederick Clapp, p. 529.
- Frederick of Wurtemberg. Large, broad pyriform, yellow with crimson cheek; juicy, melting; varying from excellent to worthless. September. Belgian.
- Frederika Bremer. Rather large, varying from roundish to pyriform, greenish-yellow; melting, vinous. October. N. Y. Fulton, p. 535.
- Gansel's Bergamot, p. 535.
- Gansel's Late Bergamotte. Roundish, greenish, rough; granular; juicy, sugary, perfumed. December.
- Gansel's Seckel. Rather small, oblate, yellow, rough, with russet; coarse; buttery, melting, rich, aromatic. November.
- Garber. Large, irregular oblate, russet brown.
- Garnier. Pyriform, handsome; breaking, juicy, rich. Late winter.
- Gedeon Paridant. Medium, obtuse pyriform, greenish-yellow; juicy, melting, brisk, excellent. September. Belgian.
- Gendesheim. Large, obtuse, pyriform, greenish-yellow; of moderate quality. October, November. Flemish.
- General Bosquet. Large, pyriform, green; melting; very good. September.
- General Canrobert. Medium, obovate pyriform, yellow. January. French.
- General de Lourmel. Medium, obovate, greenish; juicy, melting. November.
- General Lamoricière. Medium, ovate, greenish-yellow and russet; flesh juicy, melting, rich, brisk, perfumed, sometimes astringent. October.
- General Taylor. Rather small, turbinate, cinnamon russet; granular, buttery, melting, aromatic; very rich, excellent. November.
- General Totleben. Rather large, pyriform, greenish-yellow, netted with russet; juicy and melting; very good. October.
- Gens. Medium, conic obovate, greenish, rough; sugary, rich; excellent. September.
- Gerardin. Medium, roundish, irregular, yellow with russet; granular, astringent. September.
- Giffard, p. 511.
- Gilgil. Large, roundish, russeted; crisp—cooking. Winter. French.
- Glout Morceau, p. 539.
- Golden Beurré of Bilboa, p. 529.
- Goodale. Large, pyriform (short Bartlett-shaped), handsome; very good. Tree vigorous, hardy, productive—from seed of the McLaughlin, Maine. S. L. Goodale.
- Goubalt, p. 535.
- Goubalt (Winter), p. 539.
- Gore's Heathcot. See Heathcot.
- Grand Soleil, p. 542.
- Graslin, p. 520.
- Gray Butter Pear. See Gray Doyenné.
- Gray Doyenné, p. 529.
- Gray Winter Beurré. See Gris d'Hiver.

- Great Citron of Bohemia. Small, oblong, yellow; coarse, of little flavor. September.
- Green Chisel. An erroneous name for Madeleine; also the name of a small, roundish, green summer pear, of a sweet but poor flavor.
- Green Mountain Boy. Medium, round, obovate or pyriform, rich, yellow; melting, juicy, sweet; good. October.
- Green Sugar. Rather small, oblate turbinate, green; juicy, melting, pleasant. October.
- Green Sylvange. See Sylvange.
- Green Yair. Medium, obovate, green; juicy, of moderate flavor. September.
- Gris. See Brown Beurré.
- Gris d'Hiver, p. 543.
- Groom's Princess Royal. Medium, roundish, greenish-brown; buttery, melting, sweet, high-flavored. Winter. English.
- Gros Dillen. See Diel.
- Gros Rousselet d'Août. Medium, pyriform, yellow; melting, juicy, vinous, perfumed. August. Belgian.
- Grosse Calebasse of Langelier. See Van Marum.
- Grosse Marie, or Conseiller de la Cour. See Maréchal de la Cour.
- Guernsey. See Stevens' Genesee.
- Gustin's Summer. Small, roundish, yellow; sweet, with little flavor. September.
- Hacon's Incomparable. Rather large, roundish-turbinate, yellowish-green and brown, partly russeted; buttery, melting, vinous. October. English.
- Haddington. Rather large, obovate pyriform, greenish-yellow; crisp, aromatic—baking. Winter. Phila.
- Hagerman, or Hegeman, p. 530.
- Hagerston. See Limon.
- Hamecher. Medium, long oval, slightly pyriform; melting, rich; excellent. October, November. Belgian.
- Hanners, p. 530.
- Hanover. Small, roundish-obovate, green; melting, juicy, pleasant. October. N. J.
- Hardenpont. See Glout Moreau.
- Hardy, p. 530.
- Harrison's Large Fall. Large, yellow—valued only for baking.
- Harvard, p. 520.
- Hawes' Winter. Larger, roundish, dull yellow; coarse; juicy, rich, vinous. December. Va.
- Hazel. See Hessel.
- Heathcot, p. 530.
- Hélène d'Orleans, p. 469.
- Hélène Grégoire. Medium, pyriform, greenish-yellow; juicy, melting, sweet; very good. October. Belgian.
- Henkel, p. 530.
- Henrietta, p. 513.
- Henri Bivort. Large, Doyenné-form, greenish-yellow and brown; melting, buttery, juicy, sweet, perfumed. September. Belgian.
- Henri Quatre. See Henry IV.
- Henri Van Mons. Medium, pyriform (nearly Tyson-shaped),

- yellowish with a blush; buttery, vinous, perfumed, agreeable. October.
- Henry IV., p. 530.
- Heri. Medium, roundish, greenish-yellow with a blush; juicy, tender, with an anise-like flavor. Autumn and winter.
- Hericart, p. 530.
- Hericart de Thury. Large, pyriform (Bosc-shaped), rough, light brown; buttery, rich. January. Belgian.
- Hessel. Small, obovate, yellowish-green—of little value. September. Scotch.
- Holland Bergamot. Rather large, roundish, greenish-yellow, partly russeted; crisp, very juicy, sprightly, agreeable. Keeps till spring.
- Hooper's Bilboa. See Golden Beurré of Bilboa.
- Hoosic. Large, obovate; greenish-yellow, russeted; flesh buttery, juicy, spicy, good. Tree erect, vigorous, prolific. Oct.
- Hosenshenck. See Moore's.
- Hovey. Medium, pyriform, yellow; melting, juicy, rich, vinous. French.
- Howell, p. 530.
- Huguenot. Medium, roundish, pale yellow, dotted red; breaking, sweet, rather dry. October. Mass.
- Hull, p. 531.
- Huntington, p. 535.
- Hunt's Connecticut. Medium, oblate, yellowish-green; coarse, sweet, dry—culinary.
- Hyshe's Prince Consort. Medium, pyriform, greenish-yellow; buttery, a little coarse, half melting; very good. November. English. New.
- Idaho, p. 536.
- Imperatrice de France. See Flemish Beauty.
- Inconnue Van Mons, p. 539.
- Indian Queen. Rather large, long pyriform, greenish-yellow, a brown cheek; a little coarse; half melting, sweet, not rich, soft. A market sort. September. Maine.
- Ives' Bergamot. Rather small, roundish, greenish-yellow; juicy, melting, aromatic. Early September. Conn.
- Ives' Pear. Small, turbinate, irregular, greenish and brownish-red; juicy, melting; good. Early September. Conn.
- Ives' Seedling. Rather small, round, greenish-yellow and crimson; granular; juicy, melting, perfumed. Early September. Conn.
- Ives' Virgalieu. Small, pyriform, greenish and dull crimson; granular; melting, vinous, refreshing. October. Conn.
- Ives' Winter. Medium, short pyriform, yellowish, russeted; coarse. December. Conn.
- Jackman's Melting. See King Edwards.
- Jackson. Medium, oblate approaching turbinate, greenish-yellow and russet; juicy, brisk, vinous. September. N. H.
- Jalousie. Rather large, roundish-obovate, slightly pyriform, russeted; coarse; sweet, defi-

- cient in flavor. Handsome and worthless. September.
- Jalousie de Fontenay Vendée, p. 531.
- Jaminette, p. 539.
- Japan Golden Russet. (Taihe, Canner's Japan.) Medium, russeted yellow. Worthless for fruit, but tree very ornamental.
- Jargonelle, English, or Épargne. Rather large, long pyriform, acute, greenish-yellow and dull brown; flesh rather coarse; juicy, pleasant, refreshing, sub-acid. Three weeks earlier than Bartlett. French origin.
- Jargonelle, French. Medium, obovate, greenish-yellow, with a red cheek; breaking, sweet; rots at core. Handsome, but poor. Early August.
- Jean de Witte, p. 543.
- Jersey Gratioli. Medium, conic oblate, greenish, rough, partly russeted; juicy, brisk, vinous. September.
- Joanette. See Amiré Joannet.
- Johonnot, p. 531.
- Jones' Seedling, p. 543.
- Josephine. See Jaminette.
- Josephine de Malines, p. 544.
- Jules Bivort, p. 531.
- Julienne, p. 511.
- July Pear. See Sugar Top.
- Keiffer, p. 543.
- Kennes, p. 520.
- Kenrick. Medium, greenish-yellow; juicy, buttery, sweet. September. Flemish.
- King Edwards. Large, pyriform, yellow with a red cheek; buttery, sometimes good. October.
- King's Seedling. Medium, oblate, yellowish-green, rough; granular; juicy, aromatic, perfumed. October.
- Kingsessing, p. 531.
- Kirtland, or Kirtland's Seckel, p. 531.
- Knight's Monarch. Large, obovate, yellowish-brown. Does not ripen in the Northern States. Winter. English.
- Knight's Seedling. Medium, oblate, turbinate, rough, yellowish-green; juicy, sweet. October. R. I.
- Knox. Large, oblong obovate, pale green; juicy, sweet, not rich. September. Flemish.
- Koning. Medium or large, roundish-oblate, yellowish-green and russet; juicy, melting, vinous, delicate. October. Belgian.
- Koonce. Medium, obovate pyriform; golden yellow with red cheek; flesh juicy, sweet. Ill.
- Kossuth. Large, variable, turbinate, yellowish-green; buttery, very juicy; faintly sub-acid, very good. September, October. French.
- Krull. Medium, lemon yellow with bloom; skin thick; flesh melting, and juicy when ripe, sweet. Late keeper.
- La Herard. Rather large, pyriform, pale yellow and brown; melting, juicy, sub-acid, pleasant; very good. October. Belgian.
- La Juive. Medium, turbinate,

- green and brown; melting, juicy, rich, perfumed. November. Belgian.
- La Motte. Medium, roundish, light green, strongly dotted; flesh fine grained, buttery, mild, pleasant.
- Langeleir, p. 539.
- Las Canas, p. 539.
- Latch. See Philadelphia.
- Laure de Glymes, p. 531.
- Lawrence, p. 539.
- Lawson. (Comet.) Medium to large, crimson or yellow; flesh crisp and juicy. Early summer. Comes in bearing at 8 or 10 years. Valuable South.
- Lebanon. See Pinneo.
- Le Conte. Large, yellow, moderate in quality; exceedingly productive, vigorous and profitable at the South; of no value North. Mid-summer.
- Le Curé. See Vicar of Winkfield.
- Leech's Kingssessing. See Kingssessing.
- Lee's Seckel. Medium or rather large, obovate, rich russet; buttery, rich, perfumed, excellent. September.
- Leon le Clerc. Rather large, obovate, greenish-yellow, russet at the end; flesh crisp, firm, of moderate quality—cooking. Winter.
- Leopold First. Large, turbinate, pyriform, green; melting, sweet, perfumed. December. Belgian.
- Lewis, p. 544.
- Liberale. Rather large, long pyriform, greenish-yellow, partly russeted; juicy, sweet, rich, aromatic. October.
- Lieutenant Poitevin. Large, greenish-yellow; juicy, half melting. Late winter. French.
- Limon, p. 513.
- Lincoln Coreless. Large, pyriform, yellow. Late winter.
- Linden d'Automne. See Glout Morceau.
- Little Muscat. Quite small, turbinate, yellow with brownish cheek; breaking, sweet, slightly musky. Middle of July. French. Tolerably good.
- Little Musk, or Primitive. See Little Muscat.
- Locke's Beurré. Medium, roundish, obovate, dull green; juicy, vinous. November. Mass.
- Lodge, p. 520.
- Long Green, p. 520.
- Long Green of Autumn, p. 521.
- Louis Dupont. Medium, obovate, green becoming yellow; melting, juicy, sweet, perfumed. October.
- Louise Bonne, p. 521.
- Louise Bonne d'Avranches. See Louise Bonne.
- Louise Bonne of Jersey. See Louis Bonne.
- Louise d'Orleans. See Urbaniste.
- Lucy Duke. Large, pyriform, russet, rough surface; flesh buttery, juicy, sweet. October.
- Lycurgus, p. 539.
- Lyon, p. 531.
- Mabille. See Beurré Diel.
- Madame Ducar. Medium, oval,

- green becoming yellow; very juicy, rich, perfumed. August. Belgian.
- Madame Eliza, p. 521.
- Madame Henry Desportes. Medium, yellow, melting, juicy. Mid-autumn.
- Madame Millet. Medium, obovate, rich russet; half melting, rich, perfumed, agreeable. March. French.
- Madame Treyve. Medium, obovate, pale greenish-yellow; flesh greenish-white, juicy, melting, and rich; very good. Last of August. Great bearer. French.
- Madeleine, or Magdalen, p. 511.
- Madotte. See Amadotte.
- Malconnaître d'Haspin. Large, roundish-obovate, dull yellow, with a brown cheek; juicy, rich, melting, sub-acid, perfumed. October.
- Malines. See Winter Nelis.
- Manning's Elizabeth, p. 514.
- Mansuette. Large, short pyriform, greenish-yellow; juicy, astringent—baking. September.
- March Bergamotte. Rather small, green, partly russeted; coarse, flavor moderate. English.
- Maréchal de la Cour. See Conseiller de la Cour.
- Maréchal Dillen. Large, somewhat obovate, very irregular, pale green; buttery, juicy, rich. November. Belgian.
- Maréchal Pelissier. Medium, ovate, yellow and red. Late September. French.
- Margaret. See Petit Marguerite.
- Marianne de Nancy. Large, pyriform, yellowish-green, thickly dotted; coarse, juicy, often poor.
- Marie Louise, p. 521.
- Marie Louise Nova. Rather large, pyriform, yellow, with a brown cheek; melting; sometimes good, quickly decays. September. Belgian.
- Marie Parent. Large, pyriform, rich yellow; juicy, rich, perfumed; very good. October. Belgian.
- Mars. Rather small, roundish-obovate, dull yellow with russet; melting, juicy, perfumed. October. French.
- Martha Ann, or Dana's No. 1. Medium, long obovate, yellow; juicy, sub-acid, pleasant. November. Mass.
- Martin Sec. Small, somewhat pyriform, deep yellow, russet and crimson; granular, half breaking, agreeable—cooking. December.
- Mather. Rather small, obovate, russeted and reddish; buttery, pleasant. August. Pa.
- Mauxion. Medium, roundish-oblate, yellow and thin russet; melting, sugary, aromatic, and perfumed; very good. September.
- Maynard. Medium, obovate pyriform, yellow with a red cheek; juicy, rich. Late July.
- McLaughlin, p. 540.
- McVean. Large, obovate pyriform, yellow; juicy, astringent. October. Monroe Co., N. Y.
- Meil de Waterloo. See Duc de Brabant.

- Melting Bonchrétien. See Bon Chrétien Fondante.
- Merriam, p. 536.
- Messire Jean. Medium, turbinate, yellow and russet; gritty; juicy, breaking, sweet. November. French.
- Michaux. Medium, round, yellowish-green; sweet, of moderate quality. Early October.
- Miel de Waterloo. See Duc de Brabant.
- Mignonne d'Hiver. Medium, obovate pyriform, rough, russet; granular, rich, brisk, astringent. November. Belgian.
- Miller's Early. See Summer Portugal.
- Millet of Angers. Medium, conic, angular, greenish-yellow and brown russet; buttery, very juicy, vinous, sometimes astringent. December.
- Millot de Nancy, p. 521.
- Mitchell's Russet. Rather small, inclining to conic obovate, dark russet, rough; melting, rich, perfumed. November. Ill.
- Moccas. Medium, obovate, green; juicy, not rich. December.
- Moire, p. 521.
- Mollett's Guernsey. Medium, oval pyriform, yellowish-green, somewhat russeted; melting, rich, buttery, vinous. December. English.
- Monseigneur Affre. Medium, roundish, rough greenish-russet; granular; rich, perfumed. November.
- Monseigneur des Hons. Rather small, pyriform, greenish-yellow with some russet; buttery and melting, sweet, good, of moderate quality. August. French.
- Monsieur le Curé. See Vicar of Winkfield.
- Montgeron, or New Frederick of Wurtemberg. Medium, pyriform, yellow and orange; melting, half buttery, rich, perfumed. Late September.
- Montigny. See Countess of Lunay.
- Moore's, p. 532.
- Moore's Pound. See Moore's.
- Moor-fowl Egg. An incorrect name for Swan's Egg.
- Morgan. Large, oblate, greenish-yellow; flesh white, a little gritty; sweet, juicy, vinous. October. N. C.
- Mount Vernon, p. 532.
- Moyamensing, p. 514.
- Muscadine, p. 514.
- Mulky. See Idaho.
- Muscat Petit. See Little Musk.
- Muscat Robert. Rather small, greenish-yellow; juicy, pleasant. Late July.
- Musk Summer Bon Chrétien. See Summer Bon Chrétien.
- Muskingum, p. 515.
- Musque. See Montigny.
- Nabours. Rather large, greenish-yellow; juicy, buttery, sweet. Strong grower. Ga.
- Nantais, p. 521.
- Nantes. See Nantais.
- Napoleon, p. 521.
- Naumkeag. Medium, roundish, yellow russet; melting, astringent. October. Mass.

- Navey, p. 526.
- Negley. Rather large, obovate pyriform, yellow and bright crimson, fair and handsome; firm; juicy, rich. September. Pittsburg, Pa. New.
- Ne Plus Meuris. Rather small, roundish, irregular, dull yellowish-brown, partly russeted; agreeable. Winter. Belgian.
- Newtown Virgalieu. An early winter baking-pear. L. I.
- Nickerson. Rather large, resembling Louise Bonne of Jersey; very good. Tree vigorous, hardy, productive. S. L. Goodale. Me. New.
- Niell. Large, obovate, slightly pyriform, pale yellow; juicy, sweet, agreeable. Late September. Belgian.
- Noisette. Medium, obovate, yellow, dotted brown; melting, sprightly; very good. Foreign.
- Nouveau Poiteau, p. 522.
- Oliver's Russet. Rather small, roundish, yellow and rich brown russet, rough; coarse, flavor moderate. Late September.
- Omer Pacha, p. 532.
- Onondaga, p. 522.
- Ontario, p. 522.
- Orange Bergamot. Medium, broad turbinate, yellow, rough; firm; acid—baking. September.
- Orleans. See Duchesse d'Orleans.
- Orpheline Colmar. Large, pyriform, green becoming yellowish, with some russet; melting, juicy, sweet, perfumed; handsome and very good. October. Belgian.
- Osband, p. 514.
- Osborne. Medium, short pyriform, yellowish-green; juicy, brisk. September. Indiana.
- Oswego Beurré, p. 532.
- Oswego Incomparable. Very large, obovate pyriform, tapering to crown, yellow; coarse; pleasant, of moderate quality. September.
- Ott, p. 514.
- Oudinot. See Andrews.
- Pardee's Seedling. Small, roundish, greenish-yellow, much russeted; granular; melting, vinous, perfumed. October. Conn.
- Pailleau. Medium, turbinate, greenish-yellow, partly russeted, rough; coarse; juicy, sweet. Early September. Belgian.
- Paquency. See Payency.
- Paques. See Easter Beurré.
- Paradise d'Automne. See Autumn Paradise.
- Parsonage, p. 522.
- Passans du Portugal. See Summer Portugal.
- Pater Noster, p. 540.
- Paul Ambre. Medium, obovate, sometimes pyriform, greenish-yellow and gray russet; buttery, melting, aromatic. October.
- Paul Thielens. Large, conic obovate, yellowish; melting, slightly coarse, pleasant. November. Belgian.
- Payency, properly Payenche, p. 523.

- P. Barry. Long pyriform, pale greenish-yellow, juicy, melting, rich. December. Origin, California.
- Peach Pear. Medium, conic, turbinate, yellow; melting, rich, vinous. Late August. Belgian.
- Pendleton's Early York. Rather small, obovate, slightly pyriform, yellow; melting, sweet. Late July. Conn.
- Pengethly. Medium, oval, light green, thickly dotted; coarse; juicy, sweet; good. February. English.
- Pennsylvania. Medium, obovate, brown russet on dull yellow; rather coarse; half melting; moderately good. Late September. Phila.
- Perpetual (Beurré Perpetual.) Medium, yellow, juicy. Bears two crops a year.
- Petit Marguerite. Rather small, short obovate, pale yellow; juicy, melting, perfumed; good. August. French.
- Petit Rousselet. See Rousselet de Rheims.
- Petré, p. 532.
- Philadelphia, p. 532.
- Philippe Delfosse. Medium or large, varying from oblate to pyriform, rich yellow, shaded light red; buttery, melting, very juicy, rich, perfumed. December, January. Belgian.
- Philippe Goes. Medium, turbinate pyriform, rough, russeted; juicy, sweet, perfumed; very good. November. Belgian.
- Pinneo, p. 514.
- Piquery. See Urbaniste.
- Pitmaston Duchesse. Large, obtuse pyriform, uneven, yellow, with some red and russet; half melting, vinous; good. October. English. New.
- Pitt's Prolific. Medium, oblong pyriform, yellow; coarse; sweet; rather poor. September.
- Pius IX. Large, conic oblate, somewhat pyriform, yellow; granular; rich; good. Late September. A good market pear, of moderate flavor.
- Plombgastel. See St. Michel Archange.
- Pocahontas. Medium, obovate, or turbinate pyriform, yellow; melting, sweet, musky. Early October. Mass.
- Poire d'Abondance. Rather large, oblong pyriform, pale yellow; melting, juicy, sweet, good. October.
- Poire d'Albret or Beurré d'Albret. Medium, pyramidal, rough, brown russet; coarse; juicy, vinous, rich, perfumed. October.
- Poire d'Avril. Large, roundish-conic, greenish-yellow; granular; juicy, sweet, agreeable—baking. November to February.
- Poire de Cadet. See Bergamotte Cadette.
- Poire de Chasseurs. Medium, short pyriform, greenish-yellow; juicy, buttery, perfumed, vinous. October. Belgian.
- Poire de Lepine. Small, oblate, yellowish and red; granular; melting, vinous, perfumed. November.

Poire Guillaume. See Bartlett.
 Poire Neige. See White Doyenné.

Pope's Quaker. Medium, oblong pyriform with yellow russet; juicy, pleasant. October. L. I.

Pound, p. 540.

Pratt, p. 523.

Preble, p. 532.

Précoce. Large, pyriform, greenish becoming yellow, melting, not rich. Early autumn. Productive. French.

President Mas. Large, pyriform, orange yellow with russet; juicy, melting and sweet. Early winter. French.

Prevost. Medium, rich yellow with a red cheek; sweet, perfumed. Winter. Belgian.

Primitive. See Little Musk.

Prince Albert. Medium, pyriform, yellowish; melting, rich. February. Belgian.

Prince's St. Germain, p. 544.

Princess Charlotte. Medium, short pyriform, greenish; of little value here. October. Belgian.

Princess Maria. Rather small, pyramidal, yellow, mostly russeted; coarse; sweet, agreeable. October. Belgian.

Princess of Orange. Medium, roundish, russeted; crisp, juicy, astringent. October. Flemish.

Pulsifer, p. 512.

Queen of the Low Countries, p. 523.

Quenast. Obovate, yellowish; juicy, melting, sweet, pleasant.

Quéssoy (or Caissoy) d'Été. Medium, round oval, russeted, rough; juicy, half-melting, rich, perfumed. September.

Quinnipiac. See St. Ghislain.

Rallay. Medium, short pyriform, yellow, thinly russeted; buttery, melting; good. Winter.

Rance. Medium, obtuse pyriform, dark green; melting, sweet, rich. Winter. Fine in Europe—mostly fails here except at the South.

Ranz. See Rance.

Rapelje. Medium, varying from obovate or turbinate to pyriform, yellowish, russeted; juicy, varying from a rich aromatic to a poor flavor. September. L. I.

Raymond, p. 532.

Read's Seedling. See Oswego Beurré.

Reading, p. 540.

Red Doyenné. See Gray Doyenné.

Reeder. See Dr. Puder.

Reine Caroline. Medium, narrow, pyriform, yellow with a red cheek; crisp, dry, poor. November.

Reliance, p. 515.

Retour de Rome. Medium, oblate, yellowish, partly russeted; granular; melting, vinous. September. Belgian.

Richards. Rather large, obovate, yellow; granular; melting, vinous. October. Delaware.

Richardson's Seedling. Rather large, obovate, yellow; melt-

- ing, sprightly, pleasant. October.
- Richelieu. Large, obtuse pyriform, greenish-yellow; but-tery, sweet, aromatic, some-times astringent. December.
- Ridelle's. Medium, oblate tur-binate, yellow and bright red; of moderate quality. Septem-ber. Belgian.
- Robin, p. 536.
- Roe's Bergamotte, p. 536.
- Romain. Medium, obovate, greenish-yellow; juicy, sweet, agreeable. September, Octo-ber.
- Ropes. Medium, obovate, rus-seted; rich, perfumed; good. October. Mass.
- Rosabirne. Medium, pyriform, greenish, russeted; juicy, vi-nous, somewhat astringent. October.
- Rose Doyenné. Rather large, obovate, yellow and crimson; coarse, granular; flavor poor; rots at core. October.
- Rostiezer, p. 512.
- Rouge. See Brown Beurré.
- Rousselet Esperen. Pyriform, turbinate, yellow; juicy, vin-ous, perfumed. September.
- Rousselet de Meester. Medium, roundish, yellow with a red cheek; coarse, not rich. Octo-ber. Belgian.
- Rousselet de Rheims. Small, obovate pyriform, yellowish-green; sweet, aromatic—rots at core. Early Sept. French.
- Rousselet Hâtif. See Early Rousselet.
- Rousselet Stuttgart. Below me-dium, conic, greenish with a brown cheek; juicy, sweet, aromatic—rots at core. Late August.
- Rousselet Vanderwecken. Small, roundish or obovate, yellow; juicy, aromatic, per-fumed; very good. November.
- Royale. See Diel.
- Rutter. Medium, round obo-vate, greenish-yellow; partly melting, sweet; very good. October. West Chester, Pa.
- Sabine. See Jaminette.
- Salisbury Seedling. Short pyri-form, partly russeted; coarse; rather poor. October. N. Y.
- Sam Brown. Medium, roundish, pale yellow, thin russet; juicy and melting, vinous, rich; very good. September. Md.
- Samoyeau. Medium, yellow, red cheek; buttery, juicy. Mid-autumn.
- Sand Pear. Medium, roundish-pyriform, yellow, with rough russet. September. Only valu-able for cooking. The Japan pear resembles the Sand, but ripens later, and is a vigorous grower and abundant bearer. Fine for cooking.
- Sanspareil. Large, irregular, obscure pyriform, yellowish-green; coarse, juicy, buttery, vinous. November.
- Scheidweiller. Medium, obovate pyriform, dull green; buttery, sweet, rich. October.
- Scotch Bergamot. See Hamp-den's Bergamot.
- Seckel, p. 532.
- Selleck, p. 523.
- Seneca, p. 523.

- Serrurier, p. 533.
- Seutin. Medium, oval pyriform; irregular, green. A late cooking-pear.
- Sheldon, p. 536.
- Shenks. See Hosenshenck.
- Shepard, p. 533.
- Sickel. A corruption of Seckel.
- Sieulle, p. 544.
- Simon Bouvier. Small, pyriform, green; melting, perfumed. September. Belgian.
- Six. Large, pyriform, green; buttery, melting, rich, perfumed. November, December.
- Skinless, p. 512.
- Smith's Bordenave. See Lodge.
- Snow Flower. See *Fleur de Neige*.
- Soldat Laboureur, p. 523.
- Sophia. Medium, long pyriform, lemon yellow; buttery, melting, vinous, rich. Early October.
- Soulange, p. 523.
- Souvenir d'Esperen, p. 524.
- Souvenir du Congress. Very large, long pyriform; yellow; buttery, melting, quality moderate. August and September. French. New. Variable, often excellent.
- Souveraine d'Été. Medium, conic obovate, light yellow, crimson dotted; melting, rich, vinous. Early September.
- Souveraine d'Hiver. See *Passe Colmar*.
- Souveraine de Printemps. Medium, oblate, ribbed, yellow; granular; melting, vinous, somewhat astringent. March.
- Spence. Medium, short pyriform, yellow and dull crimson; juicy, melting, rich, vinous. September. Belgian.
- Spice, or Musk Pear. See *Rousselet de Rheims*.
- St. Andre, p. 533.
- St. Dennis. Small, turbinate, ribbed, yellowish and red; sweet, aromatic. Late August.
- St. Dorothee. Large, pyriform, tapering to crown, greenish-yellow; juicy, melting, rich, sweet, perfumed. October.
- St. Germain, p. 540.
- St. Germain, Brande's, p. 541.
- St. Germain, Prince's, p. 544.
- St. Ghislain, p. 523.
- St. Lambert. See *English Jar-gonelle*.
- St. Menin. Large, long, pyriform, yellowish-green; melting, juicy; very good. September.
- St. Michael. See *White Doyenné*.
- St. Michael Doré. See *Gray Doyenné*.
- St. Michel Archange, p. 523.
- St. Nicholas. See *Orleans*.
- St. Vincent de Paul. Small, russet. January. French.
- Sterkman's, p. 524.
- Sterling, p. 533.
- Steven's Genesee, p. 537.
- Stone. Large, pyriform, yellow; buttery, slightly astringent. August. Ohio.
- Styer. Medium, roundish, greenish-yellow; buttery, melting, very rich, perfumed. September. Pa.
- Styrian. Large, pyriform, deep yellow with a red cheek; crisp, rich. October. English.
- Sucrée de Hoyerswerda. Small,

- obovate, yellowish-green; juicy, sweet, sprightly. Late August. German.
- Sugar Top. Medium, obovate turbinate, yellow; of rather dry, sweet flavor; moderate or poor. Late July.
- Sullivan. Medium, oblong pyriform, greenish-yellow; juicy, sweet, pleasant. September. Belgian.
- Summer Aremberg. Rather small, short pyriform, pale greenish-yellow, with some nettings of russet; a little coarse; melting, sweet; very good. Mid-autumn. English.
- Summer Bell, or Windsor. Large, pyriform, regular, yellowish-green; tender, coarse, astringent—rots at core. Tree a handsome grower and great bearer. Late August.
- Summer Bergamot. Small, round, greenish-yellow; juicy, rich, becoming dry. Early August.
- Summer Bon Chrétien. Large, pyriform, ribbed, rich yellow with a reddish cheek; breaking; very juicy, sweet. Formerly much valued, now generally destroyed by black mildew. Early September.
- Summer Doyenné, p. 514.
- Summer Franc Real. Medium, obovate, slightly pyriform, yellowish-green; fine-grained, buttery, sweet, pleasant. Early September.
- Summer Portugal, p. 515.
- Summer Rose. Medium, roundish, yellowish; of poor quality. Late August.
- Summer St. Germain. Medium, obovate, green; juicy, slightly acid. Late August.
- Summer Thorn. See Épine d'Été.
- Superfin, p. 533.
- Superfondante. Medium, obovate, pale yellow; buttery, melting; good. October.
- Supreme de Quimper, p. 512.
- Surpasse Crassane. Resembling the old Crassane, but more productive, healthy and vigorous. Belgian.
- Surpasse Meuris. Medium, conic, rough, russeted; melting, vinous. October.
- Surpasse Virgalieu, p. 533.
- Suzette de Bevay, p. 540.
- Swan's Egg. Small, oval, pale green; juicy, sweet, slightly musky. October.
- Swan's Orange. See Onondaga.
- Swiss Bergamot. Medium, roundish, slightly turbinate, pale green and pale red; melting, sweet, agreeable. October.
- Sylvange. Roundish-obovate, pale green; melting, sweet, agreeable. October. Keeps well.
- Taihe. See Japan Golden Russet.
- Tarquin des Pyrenées. Large, pyriform, green; quality poor—great keeper.
- Taylor Pear. Medium, roundish-oblate, green; buttery, vinous, with vanilla flavor. Early winter. Va.
- Tea, p. 533.
- Theodore Van Mons, p. 524.
- Therese Appert. Medium, pyriform,

- form, deep yellow with some russet, a rich brown cheek; juicy, melting; very good. September. New. French.
- Thompson, p. 533.
- Thuerlinckx. Very large, but of little value. Belgian.
- Tillington. Small, obovate, dark green, rough; coarse, of moderate quality. October. English.
- Totten's Seedling. Rather small, turbinate pyriform, pale yellow; buttery, melting, vinous, perfumed. Early October. Connecticut.
- Triomphe de Jodoigne, p. 524.
- Trout Pear. See Forelle.
- Tyler. Small, turbinate, yellow; granular; melting, brisk, vinous. October.
- Tyson, p. 512.
- Upper Crust. Rather small, obovate, green, partly russeted; buttery, melting; very good. July at the South—not good North.
- Urbaniste, p. 524.
- Uvedale's St. Germain. See Pound.
- Vaet. Medium, obovate, yellowish-green, rough; juicy, sweet, perfumed. December.
- Vallee Franche. Medium, obovate, greenish-yellow; juicy, sweet, flavor rather poor. Early September.
- Van Assche, p. 533.
- Van Buren. Large, obovate, yellow with a blush; crisp, sweet, perfumed. Handsome—of moderate quality. An excellent culinary sort. New Haven, Conn.
- Van Marum. Large, pyriform with a long neck, bronze-colored; coarse, fibrous; not juicy, pleasant—baking. Late autumn.
- Van Mons' Leon le Clerc, p. 524.
- Vauquelin. Rather large, obovate; juicy, sub-acid. Winter.
- Vermillion d'en Haut. Medium, pyriform (Tyson-shaped), pale yellow, a red cheek; fine, juicy, sweet; very good. September. French.
- Vermont Beauty, p. 533.
- Verte Longue. See Long Green.
- Verte Longue of Angers, p. 524.
- Veterans. Large, obtuse pyriform, light yellow, some russet; flesh firm—cooking. Winter.
- Vezouziere. Rather small, roundish-oval, yellowish; juicy, melting, sweet, agreeable. September.
- Vicar of Winkfield, p. 540.
- Vicomte de Spoelberch, p. 544.
- Virgalieu. See White Doyenné.
- Wadleigh. Rather small, roundish-obovate, yellow; melting, juicy; very good. Early September. N. H.
- Walker. Large oblong, pyriform, greenish-yellow; a little coarse; half melting, sweet; good. October. Belgian.
- Walker's Seedling. See Mount Vernon.
- Washington, p. 533.
- Waterloo. See Duc de Brabant.
- Wendell. Medium, pale yellow,

- often with a red cheek; melting, juicy, not rich. Late August. Belgian.
- Westcott, p. 534.
- Wharton's Early. Rather large, obovate pyriform, yellowish-green; melting, juicy, sweet. Late August.
- Wheeler. Medium, roundish-obovate, yellowish-green; coarse; juicy, perfumed. Early September. R. I.
- White Beurré. See White Doyenné.
- White Doyenné, p. 534.
- White's Seedling. Medium, roundish-obovate, greenish-yellow; juicy; good. New Haven, Conn.
- Wiest. Medium, roundish, oval, green; melting, sub-acid, pleasant. September. Pa.
- Wilbur, p. 534.
- Wilder, p. 512.
- Wilkinson, p. 534.
- Willermoz, p. 541.
- William Edwards. Medium, obtuse pyriform, yellow, thickly dotted; buttery, sweet. September. Conn.
- Williams' Bonchrétien. See Bartlett.
- Williams' Early. Small, roundish, turbinate, bright yellow, dotted red; juicy, rich, slightly musky. Early September. Mass.
- Williamson. Medium, obovate, rich yellow, thickly dotted; fine grained; juicy, rich. October. L. I.
- Wilmington, p. 524.
- Wilkinson, p. 534.
- Windsor. See Summer Bell.
- Winship's Seedling. Medium, conic pyriform, yellow; juicy, pleasant. Late summer. Mass.
- Winter Bell. See Pound.
- Winter Bergamot. See Easter Bergamot.
- Winter Beurré. Medium, long pyriform, greenish, rough; flesh buttery, melting, vinous. January.
- Winter Nelis, p. 541.
- Winter Seckel. Medium, oblate, yellowish-brown, partly russeted; juicy, rich, sweet, aromatic. February. Va.
- Wolaston. See Glout Morceau.
- Worden, p. 524.
- Worden's Seckel. See Worden.
- Woronson. Medium, yellow. Great bearer. October.
- Wredow. Medium, oblate approaching pyriform, greenish-yellow and russet; juicy, melting, rich, vinous. October.
- Yat. Small, turbinate, brown russet; juicy, perfumed—rots at core. September.
- Yellow Butter. See White Doyenné.
- York Bergamot. See Autumn Bergamot.
- Zephirin Gregoire, p. 544.
- Zephirin Louis Gregoire. Medium, turbinate, yellow with a red cheek; very juicy, slightly perfumed. December.
- Zoar Beauty. Medium, pyriform, light yellow, with a red cheek; partly melting, sweet; moderately good—rots at core. August. Ohio.

PERSIMMONS.

- American Date Plum. See Diospyros Virginianum.
 Among. See Yemon.
 Costata, p. 677.
 Diospyros Mabola, p. 669.
 Diospyros Texana, p. 669.
 Diospyros Virginianum, p. 669.
 Hachiya, p. 675.
 Hiyakume, p. 675.
 Imperial. See Hachiya.
 Kurokume, p. 677.
 Maru-gata. See Yeddo-ichi.
 Mazelli, p. 677.
 Minokaki. See Tsuru.
 Miyotan. See Mazelli.
 Okame, p. 675.
 Taber's 129, p. 674.
 Tanenashi, p. 676.
 Tsuru, p. 677.
 Yamato. See Hachiya.
 Yeddo-ichi, p. 676.
 Yemon, p. 675.
 Zengi, p. 674.

PINEAPPLES.

- Abbaka. See Abbakacha.
 Abachi, p. 684.
 Abbakacha. See Abachi.
 Albert, p. 685.
 Antigua, p. 685.
 Brazilian. See Abbakacha.
 Black Jamaica, p. 621.
 Black Spanish. See Spanish.
 Charlotte Rothschild, p. 621.
 Cuban. See Spanish.
 Egyptian. See Queen.
 Enville, p. 685.
 Gipsy Queen. See Queen.
 Golden. See Queen.
 Havana. See Spanish.
 Jamaica, p. 685.
 Key Largo. See Spanish.
 Lemon. See Queen.
 Pitch Lake. See Porto Rico.
 Porto Rico, p. 684.
 Prickly Cayenne, p. 621.
 Queen, p. 684.
 Red Pine. See Spanish.
 Red Spanish, p. 620.
 Rothschild, p. 685.
 Smooth Cayenne, p. 684.
 Spanish, p. 684.
 Strawberry. See Spanish.
 Trinidad. See Porto Rico.
 Victoria. See Queen.

PLUMS.

- Abricotée Rouge. Medium, oval, red and violet; sweet, dry, poor. Dom.
 Abundance, p. 575.
 African. Medium, round, dark red. Texas. Chick.
 Agen Date. See Prune d'Agen.
 Albany Beauty, p. 566.
 Amber Primordian. See Primordian.
 American Eagle, p. 548.
 American Wheat. Small, roundish, pale blue; juicy, sweet. Late August. Great bearer. Dom.
 American Yellow Gage. See Prince's Yellow Gage.
 Angelina Burdett. Medium, round, nearly black, thickly dotted; rich; excellent. English. September. Dom.
 Apple Plum. Medium, roundish, reddish-purple; slightly coarse; sprightly. September. Mass. Dom.
 Apricot, p. 566.
 Archduke, p. 552.
 Arkansas Lombard. Medium, round, red. Ark. Chick.
 Autumn Gage, p. 566.
 Babcock. See Abundance.
 Bailey. See Chabat.
 Bassett's American. Small, round, dull red; skin thick; little value. Am.
 Bayfield. Small, round, light yellow; good—clingstone. August. Dom.
 Beach, p. 548.
 Beaty, p. 548.
 Beauty of Naples, p. 552.
 Beekman's Scarlet. See Lombard.
 Belgian Purple. Medium, roundish, purple; a little coarse; juicy, sweet, rich. September. Dom.
 Belle de September. Very large, oval, reddish-brown; culinary. October. Dom.
 Berckman's, p. 576.
 Berger, p. 576.
 Bingham, p. 567.
 Black Damask. Medium, roundish, greenish-yellow; juicy, sweet, rich. August. Dom.
 Black Damson. See Damson.
 Black Imperial. See Bradshaw.
 Black Morocco. See Morocco.
 Bleecker's Gage, p. 566.
 Bleecker's Scarlet. See Lombard.
 Blood. See Satsuma.
 Blue Damson. See Damson.
 Blue Gage. Small, round, dark blue; slightly acid; moderately rich. Of little value. August. Dom.
 Blue Holland. See Holland.
 Blue Imperatrice, p. 552.
 Blue Perdrigon. Medium, oval, reddish-purple; flesh firm; sugary—clingstone. August. Dom.
 Bolmar, or Bolmar's Washington. See Washington.
 Botan. See Abundance, Berckmans, Willard.
 Bradford Gage. See Green Gage.
 Bradshaw, p. 553.

- Brevoort, or Brevoort's Purple Bolmar, p. 553.
- Bricetta. Medium, roundish-oval, yellow dotted red; juicy, rich; very good. September.
- Brill. Large, red, juicy.
- Brunswick, p. 551.
- Bruyn Gage. See Green Gage.
- Buel's Favorite, p. 567.
- Burbank, p. 576.
- Burbank, No. 3. See Hale.
- Burbank No. 4. See Heikes.
- Burgundy Prune. Medium, ovate, necked, reddish-black; juicy, rich, pleasant—free stone. September. Dom.
- Burrette's. Large, long oval, dull yellow; melting, sweet, aromatic. September.
- Caddo Chief. Small, round, red; very early. La. Chick.
- Caledonian. See Goliath.
- Catalonian. See Primordian.
- Chabat, p. 576.
- Cheney, p. 548.
- Cherry. See Myrobolan.
- Cheston. Rather small, oval, dark purple; flesh firm; sweet, sprightly—freestone. July and August.
- Chickasaw Chief. See Miner.
- Chippeway, p. 548.
- Clark. A variety of the Hortularia group, said to have been found growing wild in Maryland.
- Cloth of Gold. See Drap d'Or of Esperen.
- Clyman, p. 553.
- Coe's Golden Drop, p. 567.
- Coe's Late Red, p. 553.
- Coletta. Medium, round oblong, light red. Very early. Texas.
- Columbia, or Columbian Gage, p. 553.
- Copper Plum. Rather small, oval, deep copper color with a blue bloom. Flesh juicy, acid, adhering to the stone. An old culinary variety, very productive and profitable. Dom.
- Corse's Admiral. Rather large, oval, light purple; juicy, sprightly, moderate flavor. September. Montreal.
- Corse's Field Marshal. Rather large, oval, purplish-red; juicy, sub-acid. August. Montreal. Dom.
- Corse's Nota Bene, p. 553.
- Cottrell, p. 548.
- Cruger's Scarlet, or Cruger's Seedling, p. 553.
- Cumberland. Medium, oblong, yellow; skin thin, juicy, sweet, good. Midseason. Ga. Hort.
- D'Agen. See Prune d'Agen.
- Damask. See German Prune.
- Damson, p. 553.
- Dana's Yellow Gage, p. 567.
- De Caradeuc, p. 567.
- De Delice, p. 553.
- Deep Creek, p. 548.
- Delaware, p. 514.
- De Montford, p. 553.
- Denniston's Albany Beauty. See Albany Beauty.
- Denniston's Red, p. 554.
- Denniston's Superb, p. 567.
- De Soto, p. 548.
- Diamond. Large, round oblong; apex distinct; black, dense bloom; flesh blue white, firm, acid, free. For cooking purposes. Dom.
- Diaprée Rouge. See Red Diaper.

- Dictator. Very large, brownish-purple; rich, juicy, high flavored. Montreal. Dom.
- Domine, p. 555.
- Douglas. See Abundance.
- Downton Imperatrice, p. 567.
- Drap d'Or, p. 567.
- Drap d'Or of Esperen, p. 568.
- Duane Purple, p. 555.
- Dunmore. Small, ovate, green becoming yellow; juicy, sweet, aromatic—freestone. October. Dom.
- Dutch Prune. See Domine.
- Dutch Quetzen. See Domine Dull.
- Earliest of All, p. 577.
- Early Cross. Rather small, roundish, reddish-purple; sweet; good—clingstone. August. Mass. Dom.
- Early Damask. See Morocco.
- Early Damson. See Damson.
- Early Morocco. See Morocco.
- Early Red. Large, oval, purplish-red, with white dots; flesh firm, fair. Hardy. Russian. Texas. There is also a plum of the Chickasaw type of this name from Texas.
- Early Royal. See Royal Hâtive.
- Early Royal of Nikita. Small, roundish, reddish-purple; juicy, sweet, high flavored—partly freestone. August.
- Early Scarlet. See Myrobolan.
- Early Tours, p. 555.
- Early Violet. See Early Tours.
- Early Yellow. See Primordian.
- Early Yellow Prune, p. 568.
- Egg Plum. See Yellow Egg.
- Elfrey's Prune. Small, oval, blue; sweet, dry, firm—freestone. August. Dom.
- El Paso. Medium, round, red. Chick. Texas.
- Emerald Drop. Medium, long oval, yellowish-green; clingstone. August. Dom.
- Emerson Early, p. 551.
- English Wheat. Medium, roundish-oval, reddish-purple; juicy, sweet, rich—clingstone. August. Dom.
- Engre, p. 577.
- Excelsior, p.
- Fellenberg, p.
- Flushing Gage. See Imperial Gage.
- Footte's Early Orleans. Medium, roundish, oval, black; early; good, not rich; hardy, productive. Mass. Dom.
- Forest Garden, p. 549.
- Forest Rose, p. 550.
- Fotheringham, p. 555.
- Franklin. See Washington.
- French Apricot. See Apricot.
- Frost Gage, p. 555.
- Fourguja. See Chabat.
- Fulton, p. 568.
- Galbraith. Large, oval, purple. very good. Growth straggling. A valuable early sort. Dom.
- Garfield, p. 551.
- Gaylord, p. 549.
- General Hand, p. 568.
- General Jackson. See Miner.
- Georgeson, p. 579.
- German Gage. See Bleeker's Gage.
- German Prune, p. 556.
- Giant Prune, p. 556.
- Gifford's Lafayette. Medium, oval, purple; juicy, not rich. August. Dom.

- Gillett. See Miner.
- Gold. Large, golden yellow, overlaid red; juicy, sweet. Hybrid of a Chickasaw and Japan. Japan.
- Golden Cherry, p. 556.
- Golden Beauty, p. 551.
- Golden Gage. See Coe's Golden Drop.
- Goliath, p. 556.
- Grand Duke, p. 557.
- Green Gage, p. 568.
- Gueü, or Blue Magnum Bonum. Large, roundish-oval, dark purple; flesh firm, a little coarse, sub-acid; valuable for culinary purposes, and profitable for market. First of autumn. Lansingburg, N. Y. Dom.
- Gundaker Prune. Medium, oval, purple; high flavored. Good bearer. Pa. Dom.
- Guthrie's Apricot. Medium, roundish-oval, yellow, crimson dotted; coarse; juicy, sweet, not rich. August. Dom.
- Guthrie's Late Green. Medium, round, yellow; sweet, rich, rather dry. September. Dom.
- Guthrie's Topaz. Medium, oval, necked, rich yellow; juicy, sweet, pleasant, not rich. September. Scotch. Dom.
- Gwalsh. Large, oblong oval, deep purple; coarse; sweet, pleasant. September. Dom.
- Hale, p. 577.
- Hampton Court. See Orleans Early.
- Harrison's Peach. Medium, round oblong; dull red; thick skin; free. Minn. Am.
- Hartwiss' Yellow Prune. Medium, oval, waxen yellow; rich, sub-acid, fine. September. German. Dom.
- Hattie. Medium, round oblong, red; cling. Dom.
- Hattonkin. See Kerr, Munson, Georgeson.
- Hattonkin No. 1. See Georgeson.
- Hattonkin No. 2. See Kerr.
- Hawkeye, p. 548.
- Heikes. (Burbank No. 4.) Resembles Hale, but more flattened on the ends, and darker color; flesh acid. Japan.
- Henry Clay, p. 568.
- Highlander, p. 557.
- Hinckley. See Miner.
- Hoffman, p. 551.
- Holland Prune. Roundish, purple; sweet, pleasant—free-stone. September. Dom.
- Honey Drop. See Missouri Apricot.
- Horse Plum. Medium, oval, purple; dry, rather acid—free-stone. August.
- Howard's Favorite, p. 569.
- Howell's Early, p. 557.
- Howell's Large. See Nectarine.
- How's Amber. Medium, roundish, light red; coarse, juicy—clingstone. September. Dom.
- Hudson Gage, p. 569.
- Hudson River Purple Egg, p. 557.
- Hughes. Medium, round, cherry red; flesh yellow. Chick.
- Huling's Superb, p. 569.
- Hungarian Prune. See Pond's Seedling.
- Hytan. See Munson.

Hytan-Kayo. See Munson.

Ickworth Imperatrice, p. 557.

Ida, p. 549.

Idol. Medium, round, light crimson, splashed magenta; skin thin, cling. Late. Ill. Hort.

Illinois, p. 548.

Imperatrice. See Blue Imperatrice.

Imperial de Milan. Rather large, roundish-oval, deep purple with thick bloom; flesh greenish, rich, sweet, very good. Rather late. Am.

Imperial Diadem. See Red Diaper.

Imperial Gage, p. 569.

Imperial Ottoman, p. 570.

Imperial Rouge. See Red Magnum Bonum.

Imperial Violet. See Red Magnum Bonum.

Indian Chief. Large, round, dull red; skin thick. Hort.

Indiana Red. Large, round, red; cling. Ind. Hort.

Iona, p. 549.

Iris. Medium, red. Ill.

Isabel. See Miner.

Isabella, p. 557.

Italian Damask, p. 557.

Italian Prune, p. 557.

Itaska, p. 548.

Ives' Seedling, p. 570.

Jaune Hâtive. See Primordian. Jefferson, p. 570.

Jennie Lucas. Medium, round, yellow. Early. Texas. Chick.

Judson, p. 557.

Kanawha. Medium, round, red;

skin thick; cling. Very prolific. Late. Hort.

Kayo. See Munson.

Kelsey, p. 577.

Kerr, p. 579.

Keyser's Plum. See Huling's Superb.

Kickapoo. Medium, round oblong, red in blotches; skin thick; flesh firm; cling. Prolific. Am.

Kingston, p. 558.

Kirke, p. 558.

Knight's Large Drying. See Large Green Drying.

Lady Plum. Small, oval, light yellow, spotted red; acid; freestone. September. Great grower and bearer—culinary. Albany, N. Y. Dom.

Langdon's Seedling. Rather large, roundish-oval, reddish-purple; juicy, sub-acid—mostly clingstone. August. Conn. Dom.

Langsdon. Medium, round, light red; cling. Hort.

Large Early Damson. See Horse Plum.

Large Green Drying. Large, round, greenish-yellow; rich; very good. September. English. Dom.

Large Long Blue. See Manning.

La Royale. See Royale.

Late Blood. Small, round, dark purple; flesh red; cling. Japan.

Late Rollingstone. Similar to Rollingstone, of which it is a seedling; skin thicker, flesh softer, later. Minn. Am.

- Lawrence's Favorite, or Lawrence Gage, p. 570.
- Le Duc, p. 549.
- Leipzig. See German Prune.
- Leptune. Medium, round, dark red; skin thick; cling. Ark. Hort.
- Ledloff Green, p. 548.
- Ledloff Red, p. 548.
- Lewiston Egg. Medium, oval, pale yellow; quality moderate. August. Dom.
- Lincoln, p. 558.
- Little Queen Claude. See English Yellow Gage.
- Little Seedling. Small, red, Minn. Am.
- Lombard, p. 558.
- Lone Star. Medium, round oblong, red; very thin skin. Texas. Chick.
- Long Scarlet. Medium, oblong obovate, red; acid, ripening sweeter—clingstone. August. Dom.
- Louisa, p. 548.
- Lucombe's Nonesuch, p. 571.
- Madison, p. 571.
- Magnum Bonum. See White Egg.
- Majestic Damson. Medium; free. Early. Productive. Mo. Dom.
- Mamelonnée. Medium, oval with a distinct neck, tapering to apex, light green; sweet, pleasant, mild, not rich—freestone. Early August. French. Valuable for its earliness. Dom.
- Manning, p. 558.
- Maquoketa. Medium, round-oblong, red, yellow specks; skin thick; flesh yellow, firm, juicy; cling. Iowa. Am.
- Marianna, p. 538.
- Market Plum of Hoffy. See Golden Cherry Plum.
- Marten's Seedling. Large, oblong, yellow; brisk, sprightly flavor—freestone. September. Schenectady, N. Y. Dom.
- Maru, p. 577.
- McLaughlin, p. 571.
- Meigs, p. 559.
- Milton, p. 551.
- Mimms. See Red Diaper.
- Miner, p. 550.
- Minnetonka. Medium, round oblong, dull red; skin thick. Minn. Am.
- Mirabelle, p. 571.
- Mirabelle Grosse. See Drap d'Or.
- Mirabelle Tardive. Small, roundish-oval, greenish-yellow; sweet, juicy, agreeable—freestone. Great bearer—hangs long. October. Dom.
- Miser Plum. See Cherry.
- Missouri Apricot, p. 551.
- Moldavka, p. 571.
- Monroe, or Monroe Egg, p. 572.
- Monsieur. See Orleans.
- Monsieur Hâtif. See Orleans Early.
- Monsieur Tardif. See Suisse.
- Moore's Arctic. Below medium, roundish-oval, dark purple, with a pleasant but not rich flavor. Early autumn. Tree healthy, vigorous, extremely hardy, a great bearer. Maine. Dom.
- Moreman. Medium, round, dark red. Hort.
- Morocco, p. 559.

Mulberry, p. 572.

Munson, p. 514.

Mussey, p. 549.

Myrobolan, p. 559.

Nagate-no-Botankyo. See Red June.

Nectarine, p. 559.

Nelson's Victory, p. 572.

Newman, p. 551.

New Orleans. See Orleans Early.

Newtown Egg. Medium, oblong, red; skin thick; flesh firm, free.

Mid-season. Minn. Am.

New York Purple. See Brevoort's Purple.

New Ulm, p. 548.

Niagara. Medium, oval, dark purple; flesh pale yellow, juicy, sweet, free. Sept. Dom.

Normand, p. 579.

Ocheeda, p. 549.

Ogeechee. Small, round, red; very early. Ga. Chick.

Ogon, p. 579.

Old Hickory. See Miner.

Old Orleans, or Orleans, p. 559.

Orange, p. 572.

Orient. Large, roundish-conical, red; flesh yellow. Japan.

Orleans Early, p. 559.

Orleans, Smith's, p. 564.

Oullin's Golden Gage. Large, roundish-oblong, greenish-yellow; tender, juicy, excellent.

Productive. German. Dom.

Oyon. See Ogon.

Parsonage, p. 572.

Parsons. See Miner.

Peach, p. 560.

Peffer, p. 548.

Penobscot. Large, oval, yellow;

sweet, pleasant—clingstone. September. Me. Dom.

Peole's Early Blue. Medium, oblong, dark blue; flesh yellow; pleasant—clingstone. August. Dom.

Perfection. Medium, oblong conical, bright red, white bloom; flesh firm, sweet. Japan.

Peters' Yellow Gage, p. 572.

Pond's Purple. See Pond's Seedling (American).

Pond, p. 560.

Pond's Seedling of Massachusetts, p. 560.

Poole, p. 550.

Pottawattamie, p. 551.

Prairie Flower, p. 550.

Précoce de Bergthold, p. 572.

Précoce de Tours. See Early Tours.

Priam, p. 551.

Primordian, p. 573.

Prince Englebert, p. 561.

Prince of Wales. Large, round, slightly oblong, reddish-purple; sweet, sprightly, not rich—clingstone. September. Dom.

Prince's Imperial Gage. See Imperial Gage.

Prince's Orange Egg. Rather large, oval, yellow; coarse; sprightly, not rich. September. Dom.

Prolific. See Hale.

Prune d'Agen, p. 561.

Prune d'Allemagne. See German Prune.

Prune d'Ast. See Prune d'Agen.

Prune de la St. Martin. See Coe's Late Red.

Prune de Louvain. Large, ovate, necked, deep purple;

- coarse; melting, pleasant—freestone. August. Dom.
- Prune d'Œuf. See Egg Plum.
- Prune, Manning's. Long Blue, p. 558.
- Prune Pêche. See Peach Plum.
- Prune Suisse. See Suisse.
- Prunus Simonsi. See Simonsi.
- Purple Damson. See Damson.
- Purple Egg. See Red Magnum Bonum.
- Purple Favorite, p. 561.
- Purple Gage, p. 561.
- Purple Magnum Bonum. See Red ditto.
- Purple Yosemite. See Yosemite.
- Quackenboss, p. 562.
- Quaker, p. 549.
- Queen Mother. Small, round, pale red and purple; sweet, rich—freestone. September. English.
- Quetsche. See German Prune.
- Rachel. Medium, round oblong, dull red; thick skin; cling. Mid-season. Hort.
- Red Diaper, p. 562.
- Red Egg. See Red Magnum Bonum.
- Red Gage, p. 562.
- Red June, p. 577.
- Red Magnum Bonum, p. 562.
- Red Nagate. See Red June.
- Reed. Medium, round, dark red; cling. Hort.
- Reine Claude. See Green Gage.
- Reine Claude de Bavay, p. 574.
- Reine Claude Diaphane. Medium, roundish, clear green, shaded red; juicy, sweet, aromatic. September. French. Dom.
- Reine Claude d'Octobre. Small, roundish, greenish-yellow; juicy, rich—freestone. October. Dom.
- Reine Claude Rouge. Very large, roundish-oval, red and purple; rich, slightly acid, aromatic. September. Dom.
- Reine Claude Violette. See Purple Gage.
- Reizenstein's Yellow Prune. Medium, oval, slightly necked, yellow; juicy, pleasant—clingstone. September. Italian. Dom.
- Rhinebeck Yellow Gage. Large, oval, yellow; coarse; sweet, pleasant—clingstone. September. Rhinebeck, N. Y. Dom.
- Richland. Rather small, reddish-purple; flesh greenish-yellow; good. A seedling of the damson, ripening end of August, and profitable for market. Origin, Pa. Dom.
- Rivers' Favorite, p. 562.
- Rivers' Early Prolific. Medium, roundish-oval, reddish-purple; juicy, sweet, pleasant—freestone. August. English. Dom.
- Robinson, p. 551.
- Rockford, p. 549.
- Roe's Autumn Gage. See Autumn Gage.
- Rollingstone, p. 549.
- Roulette. Medium, round, red; skin thin; cling. Mid-season. Texas. Hort.
- Royale, p. 562.
- Royal Hâtive, p. 563.
- Royal Tours, p. 564.
- Saint Catherine, p. 574.

Saint Cloud. See Goliath.

Saint Martin's Quetsche, p. 574.

Saint Martin Rouge. See Coe's Late Red.

Saint Maurin. See Prune d'Agen.

Saratoga. Oval, brownish-red, with few white specks; flesh pale yellow; free. Late. Dom.

Satsuma, p. 578.

Scarlet Gage. See Long Scarlet.

Schuyler Gage, p. 574.

Schenectady, p. 564.

Schley. (Schley Large Red.) Medium, round, red. Ga. Chick.

Sea. Small, round, brownish-purple; flesh greenish-yellow, sweet, juicy—freestone. August. Dom.

Semiana. Medium, oval, necked, deep purple; flesh juicy, sub-acid, moderately rich. Distinct from Blue Imperatrice, which see. Dom.

Shailer's White Damson. See White Damson.

Sharp's Emperor, p. 564.

Sheen. See Fotheringham.

Shipper, p. 515.

Shiro-Smomo. See Berger, also Red Nagate, and Ogon. Japan.

Siamese. Medium, obovate, pale yellow; juicy, sprightly, of moderate flavor. Fruit often in pairs—tree a great bearer. September. Dom.

Simiana. See Suisse.

Simon's Apricot Plum. See Simonsi.

Simoni, p. 578.

Sloe. Ornamental, sometimes used for stocks. Is a distinct

species (*Prunus Spinosa*).

The fruit is small and black; often called Blackthorn. Dom.

Small Green Gage. See Yellow Gage. English.

Smith's Orleans, p. 564.

Southern Golden Drop. Large, golden yellow. Chick.

Spaulding. Medium, yellow, green marbled; flesh pale yellow, very sweet; free. Dom.

Speer, p. 549.

Splendor. A large prune, cross of Petite d'Agen and Pond's Seedling. Dom.

Stanton. Medium, round, purple, blue bloom. Late. Dom.

Stark Green Gage. Medium; very prolific. A seedling of Missouri Green Gage. Dom.

Steer's Emperor. See Goliath.

Stoddard, p. 550.

Strawberry. Small, round oblate, dark red; flesh yellow; cling. Very early. Japan.

Sucker State. Large, round, red; skin thick; cling. Hort.

Sucrin Vert. See Green Gage.

Suisse, p. 565.

Surprise, p. 549.

Sweet Botan. See Berckman's.

Sweet Damson. See Damson.

Swiss Plum. See Suisse.

Texas Bell. Medium, round, red. Texas. Hort.

Thomas, p. 565.

Townsend. See Miner.

Tragedy, p. 565.

Trouvée de Voueche. Medium or small, oval, violet; juicy, sweet; very good. August.

Turkish Quetsche. See German Prune.

- Van Buren, p. 550.
 Vert Bonne. See Green Gage.
 Victoria, p. 565.
 Violet. See Blue Imperatrice.
 Violet de Tours. See Early Tours.
 Violet Diaper. See Cheston.
 Violet Perdrigon. See Blue Perdrigon.
 Violet Queen Claude. See Purple Gage.
 Violette Hâtive. See Early Tours.
 Virgin. Medium, roundish, reddish-purple; juicy, sweet; very good. September. Dom.

 Wangenheim, p. 566.
 Warren. See Newman.
 Washington, p. 574.
 Wasse Smomo. See Earliest of All.
 Wax, p. 566.
 Wayata. Small to medium, round, dull red; thick skin; cling. Minn. Am.
 Wayland, p. 550.
 Weaver, p. 549.
 Whitaker, p. 550.
 White Apricot. Medium, roundish, yellow; flesh firm, pleasant—clingstone. August.
 White Egg. See Yellow Egg.
 White Empress. See White Imperatrice.
 White-flushed Botan. See Berckman's.
 White Gage. See Imperial Gage.
 White Holland. See White Egg.
 White Imperatrice. Medium, obovate, bright yellow; juicy, crisp, sweet, translucent—free-stone. September. Dom.
 White Imperial. See Yellow Egg.
 White Magnum Bonum. See Yellow Egg.
 White Mogul. See Yellow Egg.
 White or Yellow Damson, p. 574.
 White Perdrigon. Medium, oval, pale greenish-yellow; sweet—clingstone. August. Dom.
 White Plum. See Ogon.
 White Primordian. See Primordian.
 Wickson, p. 578.
 Wier, p. 549.
 Wild Goose, p. 550.
 Wild Rose. Large, round, yellow bluish; skin medium; flesh firm; cling. Minn. Am.
 Wilkinson. Medium, oval, slightly necked, reddish-purple; firm, sweet, not high flavored. September. Dom.
 Willard, p. 578.
 William Dodd. See Miner.
 Wilmot's Green Gage. See Green Gage.
 Wilmot's Late Orleans. See Goliath.
 Winter Damson. See Damson.
 Wolf, p. 550.
 Woolston's Black Gage. Small, round, dark, rich. September.
 Wooton, p. 551.
 World Beater. Large, round oblong, red; cling. Very late. Tenn.
 Wyant, p. 549.

 Yellow Apricot. See Apricot.
 Yellow Egg, p. 574.
 Yellow-flushed Botan. See Abundance.
 Yellow Gage, English, p. 575.

- Yellow Gage, Prince's, p. 575. Yellow Yosemite. Said to be
 Yellow Japan. See Chabat. same as Purple Yosemite. Am.
 Yellow Magnum Bonum. See Yonemomo. See Satsuma.
 White Egg. York State Prune, p. 566.
 Yellow Perdrigon. See Drap Yosebe. See Earliest of All.
 d'Or. Yosemite, p. 549.
 Yellow Sweet, p. 550. Zwetsche. See German Prune.
 Yellow Transparent, p. 551.

POMEGRANATES.

- Caribbean Coral, p. 687. Purple-Seeded. See Spanish Ruby.
 Paper Shell, p. 687. Ruby, p. 687.

QUINCES.

- Alaska, p. 582. Orange, or Apple Quince, 582.
 Angers, p. 582.
 California. See Child's
 Champion, p. 582.
 Child's, p. 582.
 Chinese, p. 583.
 Fontenay, p. 583.
 Fuller's, p. 583.
 Johnson's, p. 583.
 Oblong. See Pear Quince.
 Paris Quince. See Fontenay.
 Pear Quince, p. 583.
 Portugal, p. 583.
 Rea's Mammoth, p. 584.
 Rea's Seedling. See Rea's
 Mammoth.
 Van Deman, p. 584.
 Wist's Mammoth, p. 584.

RASPBERRIES.

- Ada. Small, round, black, firm, dium, black, juicy, nearly
 sweet; productive. Late. sweet. Mid-season. Va.
 Addison. Medium, purple, firm, American Whitecap. See Golden
 juicy; vigorous, hardy, pro- Cap.
 ductive. Antwerp. See Hudson River
 Allen, p. 531. Antwerp, Red Antwerp, Yel-
 American Blackcap, p. 530. low Antwerp.
 American Everbearing. Me- Arnold's Orange. Large, dark

- orange; excellent. New. Davison's Thornless, p. 592.
Paris, C. W. Doolittle, p. 592.
- Double Bearing. A variety of
Antwerp, bearing a second
crop, now superseded.
- Duhring. Large, crimson; soft;
good. Phila.
- Early Prolific, p. 594.
- Emily. Large; sometimes shoul-
dered; yellow.
- Erie, p. 594.
- Eureka, p. 592.
- Fastolff, p. 590.
- Fillbasket, p. 590.
- Franconia, p. 590.
- French, p. 590.
- Ganargua, p. 593.
- General Patterson. Large, red
Phila. Dr. Brinckle.
- Gladstone. See Erie.
- Golden Cap, p. 593.
- Golden Queen, p. 595.
- Golden Thornless, p. 593.
- Gregg, p. 592.
- Hansel. Medium, round, bright
red; juicy; good. Said to be
subject to disease. Very early.
N. J.
- Harris. Medium, red, juicy,
nearly sweet.
- Herstine, p. 594.
- Highland Hardy. Rather small;
red; of poor quality. Very
early, which gives it value
for market. Sometimes un-
productive, but more com-
monly a good bearer. Ulster
Co., N. Y.
- Hilborn, p. 592.
- Hopkins, p. 592.
- Bagley's Perpetual. Medium,
oblate, red; sub-acid; poor.
- Barnet. Large, obtuse, conic,
reddish-purple. English. Of
little value.
- Belle de Fontenay, p. 589.
- Belle de Paluau, p. 589.
- Brandywine, p. 594.
- Brentford Cane. Medium, ovate,
dark red. English. Of little
value.
- Brinckle's Orange. See Orange.
- Burlington, or Prosser. Large,
firm, sweet; good. New. N. J.
- Carmen. Medium, handsome,
black, firm, juicy, sub-acid;
productive; early. Conn.
- Caroline, p. 595.
- Catawissa, p. 593.
- Champlain. Medium, pale yel-
low, soft, juicy, nearly sweet;
good. Canes vigorous, pale;
not hardy.
- Clarke, p. 589.
- Columbian, p. 593.
- Colonel Wilder, p. 591.
- Conrath, p. 592.
- Cope. Roundish, conical, red;
firm, good; growth moderate.
Phila.
- Cretan Red. Small, deep red,
poor. Old foreign sort.
- Crystal White. Medium, pale
yellow, firm, moderately juicy.
- Cumberland, p. 592.
- Cushing. Roundish, conical, reg-
ular, red; quality good; mod-
erately vigorous and produc-
tive. Phila.
- Cuthbert, p. 594.

- Hornet, p. 591.
Hudson River Antwerp, p. 590.
- Imperial Red. Medium, roundish, scarlet; pleasant. N. J.
- Japanese Wine Berry. Medium, round, translucent red; each berry enveloped in purplish red calyx. Ornamental, but of no other value. Not hardy in vicinity of New York.
- Johnson's Sweet. Black, hardy; productive.
- Joslyn's Improved. See Doolittle.
- Kansas, p. 592.
- King. Large, bright red; productive. Rio Vista, Va.
- Kirtland, p. 594.
- Knevett's Giant, p. 590.
- Large-fruited Monthly, p. 591.
- Loudon, p. 594.
- Lost Rubies. Rather large, ovate-conic; soft, with a pleasant and good flavor. Berries often defective, requiring fertilizing by another sort.
- Lovett. Large, pure black, firm; moderately juicy, sweet; vigorous; early. N. J.
- Lum's Everbearing. An autumn fruiting blackcap. Sandusky, Ohio.
- Mammoth Cluster, p. 592.
- Marlboro, p. 594.
- Marvel of the Four Seasons, p. 591.
- McCormick. See Mammoth Cluster.
- Meredeth Queen, p. 591.
- Merveille des Quatre Saisons. See Marvel of the Four Seasons.
- Miami. See Mammoth Cluster.
- Miller, p. 594.
- Mills No. 15, p. 592.
- Montclair, p. 594.
- Muskingum. Medium, soft, moderately juicy, mild sub-acid; good. Canes vigorous.
- Naomi. See Franconia, which it closely resembles, if not identical.
- Nemaha, p. 592.
- New Rochelle, p. 594.
- Northumberland Fillbasket. See Fillbasket.
- October Red. See Marvel of the Four Seasons.
- Ohio, p. 598.
- Ohio Everbearing, p. 593.
- Olathe, p. 595.
- Older, p. 593.
- Ontario, p. 593.
- Orange, p. 591.
- Palmer, p. 593.
- Parnell, p. 473.
- Pearl, p. 595.
- Philadelphia, p. 595.
- Phoenix. Large, round, red; firm, juicy, rich.
- Pilate. A dark red, new French sort, of moderate value.
- Pride of Kent. Large, red, very soft; good. Canes strong, vigorous.
- Pride of the Hudson. Large, roundish-conical; red; juicy, sweet, rich; too soft for market. Not hardy nor reliable.
- Prince of Wales, Cutbush's

- Large, crimson; firm; good. English.
 Purple Cane, p. 593.
- Red Antwerp. Large, roundish, dark red. Distinct from Hudson River Antwerp. English.
 Reder. Rather large; bright red, rich sub-acid. Vigorous; a heavy bearer. Michigan.
 Reliance, p. 595.
 Royal Church, p. 595.
 Rubus Flavus, p. 595.
- Saunders, p. 469.
 Seneca Blackcap, p. 593.
 Shaffer, p. 594.
 Silver Queen. Medium, pale yellow; very soft, juicy; good.
 Souchetti. Rather large; conical, pale yellow; firm; very good. French. New.
 Souhegan, p. 593.
 Stagman No. 5. See Olathe.
- Stoever. Large, roundish, conic, bright red; very unproductive. Vt.
 Superlative, p. 591.
 Surry. Large, black, with bloom. Va.
 Susqueco. See Pearl.
- Talbot, p. 595.
 Thompson's Prolific, p. 591.
 Turner, p. 595.
 Tyler, p. 593.
- Vermont, p. 591.
 Vice-President French. See French.
- Walker. Rather large, round, crimson; soft; good; productive. Pa. Dr. Brinckle.
- Yellow Antwerp. Large, light yellow; good. Superseded.
 Yellow Cap. See Golden Cap.

SHADDOCKS.

- Aurantium, p. 651.
- Leonardy, p. 651.
- Marsh's Seedless, p. 651.
- May's Pomelo, p. 651.
- Royal, p. 651.
- Triumph, p. 651.

STRAWBERRIES.

Imp.-Flowers imperfect; Per.-Flowers perfect.

- Aberdeen. See Roseberry.
- Accomack. Medium, soft; good; late. Per.
- Admiral Dundas. Large, irregular, pale scarlet; firm; good, not rich. English.
- Advancer. Medium, dark red; firm; early. Md. Per.
- Agriculturist. Very large, nearly conical, sometimes cocombed, somewhat necked; deep scarlet; flesh firm, of a

- pleasant, moderately good flavor. A strong grower. N. J. Fails in many localities. Old. Per.
- Ajax. Large, ovate, dark; good. English.
- Albany Seedling. See Wilson.
- Albion White. Large, round, nearly white; good. Not productive. Foreign.
- Alice Maude. Large, conical, dark glossy scarlet; juicy, rich, excellent. Plant strong, vigorous—requires deep and rich cultivation. Foreign. Per.
- Alpha. Large, ovate conical, dull red; sub-acid. Vigorous, productive. Raised by Charles Arnold, of Ontario, from Wilson and Dr. Nicaise. Per.
- American Scarlet. See Hudson.
- Annie Forest. Large, conical; bright scarlet; firm. Mid-season. Per.
- Arnold's Pride. Very large; light red; rather soft, moderate in flavor. Very productive. Canada. Per.
- Aroma, p. 604.
- Atkinson's Scarlet. See Grove End Scarlet.
- Atlantic. Medium, conical; bright dark crimson; firm, strong grower. Mid-season. Per.
- Auburn. Medium, regular, round conical; dark red; flesh scarlet; good flavor; not very productive. Imp.
- Austin. See Austin Shaker.
- Austin Shaker. Very large, roundish, light red; soft, usually hollow; poor. Per.
- Austrian Scarlet. See Duke of Kent.
- Banquet. Medium, conical, light red; sweet, rich. Per.
- Barnes' Mammoth. Large, roundish-conical, dark crimson; sub-acid, good. An uncertain bearer. Poughkeepsie, N. Y. Per.
- Bartlett. See Boston Pine.
- Barton's Eclipse, p. 608.
- Beder Wood, p. 604.
- Belle, p. 604.
- Belle de Vibert. Large, conic, crimson; handsome; firm, not rich. Productive. Foreign.
- Belmont. Medium, conical, dark crimson; firm; not productive. Per.
- Beverly, p. 604.
- Bicolor. Medium, oblong, crimson; sweet, good. Dwarf. Productive. Foreign.
- Bicton Pine. Large, roundish, white tinged with pink; pleasant but not rich. English. Tender.
- Bidwell, p. 604.
- Bishop's Orange. Large, regularly conical; light scarlet, approaching orange; flesh firm, flavor rather acid; growth low; leaves hairy. Superseded. Imp.
- Bismark, p. 604.
- Black Defiance. Large, deep red, roundish-conical; flesh firm, season medium. Has not fulfilled its early promise. Per.
- Black Giant. Large, regular, soft. Per.

- Black Imperial. See Black Prince.
- Black Roseberry. Medium, roundish, dark red or purplish; pleasant; moderate bearer. English.
- Bomba, p. 605.
- Bordelaise. Small, conical; very dark reddish-purple; musky; vigorous. Hautbois type. Foreign. Per.
- Boston Pine, p. 543.
- Boudinot. Large, roundish, scarlet; good. Ohio.
- Boyden. Medium, dark red; no special value. Per.
- Boyden's Mammoth. Large, roundish, dark crimson; poor bearer. N. J.
- Boynton. See Crescent.
- Brandywine, p. 605.
- Brewer's Emperor. Medium, ovate, dark red; good. English.
- Bright Ida. Large, roundish-conical; bright red; with a mild, pleasant, sub-acid, rather rich flavor. Vigorous and productive. Raised by Charles Arnold, Ontario. Per.
- Brighton Pine. Large, conical; deep crimson, with a rich, sub-acid flavor. Early, hardy; poor bearer. Per.
- British Queen. Very large, roundish, sometimes coxcomb-shaped; color rich scarlet; flesh rich, tender, rather early. A poor bearer. In England productive and superb. Per.
- Brooklyn Scarlet. Medium or large, long, conical, necked; sweet, flavor excellent. Productive. Per.
- Bubach (No. 5), p. 608.
- Buffalo Seedling. See McAvoy's Superior.
- Burr's New Pine, p. 608.
- Burr's Seedling. Medium, scarlet; pleasant; hardy, productive. Ohio.
- Caleb Cope. Large, pointed, scarlet; good.
- Captain Cook. Large, resembling British Queen, but smaller; color dark; rich.
- Captain Jack. Medium in size, regular in form; bright scarlet, handsome; quality moderate; rather acid. Mostly very productive, sometimes fails. Profitable for market in many places. Missouri. Per.
- Carrie, p. 608.
- Champion. See Windsor Chief.
- Charles Downing, p. 605. This variety rusts in some places of late years.
- Chorlton's Prolific. Roundish, necked, light red; good. Staten Island.
- Cinderella. Rather large, conical, regular; bright scarlet. Moderately productive. For home use. Per.
- Cleveland. Large, cockscombed and conical, deep red; firm, rich. Staminate. Ohio.
- Clyde, p. 605.
- Colfax. Small, round, poor.
- Colonel Cheney. Large, roundish-ovate, bright scarlet; flesh rather firm, of fine quality. Sometimes very productive. Imp.
- Colonel Ellsworth. Large roundish, necked, dark crim-

- son; rather firm, flavor moderate, dry. Early, productive. Per.
- Columbus. Large, roundish, dark red; tender, sweet. Hardy, productive. Ohio.
- Continental. Large, obtusely conical, regular; dark red; firm, good. Productive under hill culture. Per.
- Cornelia. Large, regular, conical, smooth; bright red. Productive. Quite late. Ohio. Imp.
- Cornucopia. Large, conical, scarlet; good. Flushing, L. I.
- Covill. Large at first picking; dark red; good; very early; needs high cultivation. Per.
- Cowing's Seedling. Very large, showy; productive. Ind.
- Cox's Seedling. Large, light red, irregular; rather acid. Late. English.
- Crawford, p. 605.
- Crescent, p. 608.
- Crimson Cone. (Dutch Berry.) Medium, uniformly conical; bright crimson, rich, acid. Varies much in productiveness. (Fuller says flowers perfect.) Imp.
- Crimson Favorite. Large, round conic, crimson; flavor fine. Unproductive.
- Crystal City. Small; moderately firm; very early. Sometimes prolific, often unproductive. Valuable only for earliness. Missouri. Per.
- Crystal Palace. Large, conical, regular, glossy scarlet; flesh firm, fine grained; juicy, high flavored. English.
- Cumberland, p. 605.
- Cushing. Rather large, roundish-conical; light scarlet; flesh tender, pleasant, sprightly, of moderate flavor. Phila. Per.
- Cutter, or Cutter's Seedling. Medium or large, conical, slightly necked; bright scarlet; soft, sweet, good. Productive. Per.
- Cyclone, p. 605.
- Daisy. Medium, obconical; vermilion; soft; rather poor. Imp.
- Daniel Boone. Large, bright crimson; ovate, necked; glossy, firm; sub-acid, good. Reliable. Kentucky. Imp.
- Dayton. Large, round conical, coxcombed; scarlet; flesh pink, sweet; not very productive.
- Deptford Pine. Large, wedge-shaped, bright glossy scarlet; solid, rich, sub-acid. English.
- Diadem. Large, round, light scarlet, showy; fine and pleasant. Plant healthy and hardy. L. I. Local. Imp.
- Downer's Prolific.* Medium, roundish-ovate; dark red; flesh soft, rather acid, moderately agreeable. Very productive. Old. Per.
- Downton. Medium, ovate, with a neck, dark purplish-scarlet; good flavor; poor bearer. English.
- Dr. Nicaise. Very large, red; quality moderate. Unproductive. Foreign.
- Duc de Brabant. Large, conical,

- cal, scarlet; good flavor. Early. Belgian.
- Duchess. Full medium, round conical, regular; bright crimson; firm, of fine quality. Productive in hills or narrow rows. Valuable for its earliness. New York. Per.
- Duke of Kent. Small, scarlet; clear, rich, acid. Very early. Superseded.
- Duncan. Full medium; quite early; excellent in quality. A moderate grower and bearer. Ulster Co., N. Y. Per.
- Dundee. Medium, roundish, scarlet; firm, rich, acid. Scotch.
- Durand. Large, irregular, scarlet. Good; not productive. N. J.
- Durand's Superb. See Prince.
- Dutch Berry. See Crimson Cone.
- Early Canada. Resembles Wilson, and is a few days earlier. Per.
- Early Virginia. See Large Early Scarlet.
- Eberlein's Seedling. Medium, conical, dark scarlet; sweet. Early, productive. American.
- Edgar Queen. Large, obtuse conical, scarlet; vigorous; productive.
- Elenora. Large, conical, scarlet; acid. Poor bearer. English.
- Eliza, Myatt's. Large, obtuse conical, glossy scarlet; excellent. Not productive. English.
- Ella. See Mitchel's Early.
- Elton. Large, acid, rich. English.
- Emma. Large, roundish, crimson; good.
- English Red Wood. See Red Wood.
- Enhance. Large, handsome, dark crimson berry; firm, vigorous, healthy plant. Per.
- Enormous. Large, deep crimson running into the flesh; very productive. Seedling of Crescent. Ill. Per.
- Eureka. Very large; moderately productive. Imp.
- Excelsior, p. 605.
- Feast's Fillmore. See Fillmore.
- Fillbasket. Very large, roundish, dark scarlet, handsome. Good bearer.
- Fillmore. Large, of uniform size, dark, glossy; solid, sweet, aromatic—sometimes poor. Often very productive—frequently fails. Imp.
- Finch. Large, round conical, uniform; rich scarlet; firm, of medium quality. Sometimes very productive. Ohio. Per.
- Finch's Prolific. See Finch.
- First Season. See Gandy.
- Forest Rose, p. 605.
- French's Seedling. Large, roundish-oval, of uniform size; light scarlet, handsome; sweet, very good. Valuable for market. Early. Vigorous, productive. Per.
- Gandy, p. 605.
- Genesee. Rather large, roundish, somewhat oblate, generally necked; scarlet inclining to crimson; tender, juicy,

- mild, pleasant. Hardy, vigorous. Rochester, N. Y. Mostly superseded. Per.
- General Scott. Large, roundish, scarlet; not rich.
- Georgia Mammoth. Medium, conical; dark crimson; firm, acid. Productive—valuable for its lateness. Per.
- Glendale, p. 543.
- Glen Mary, p. 608.
- Globe. Large, round, scarlet; excellent. English.
- Glossy Cone. Very handsome, and poor in quality. Per.
- Golden Defiance. Large, rounded, conical, regular, slightly necked; dark scarlet; firm, rich, very good. Rather late. Vigorous, productive. Carlisle, Pa. Imp.
- Golden Seeded. Large, dark, early. Succeeds well in some places.
- Goliath. Large, irregular; scarlet; rich, high flavor. Requires much room and high culture. English. Per.
- Governor Hoard. Good form and quality; dark red; poor cropper.
- Great American. Very large at its best, regular in form; good. Often worthless, and requires high cultivation. New Jersey. Per.
- Great Pacific, p. 609.
- Green Prolific, p. 608.
- Green Strawberry. Small, round, whitish, tinged reddish-brown; flesh solid, greenish, juicy, rich. Late.
- Greenville, p. 608.
- Grove End Scarlet. Medium, round, scarlet; acid. Early. English.
- Gypsy. Medium or large; handsome, excellent. Plant vigorous. A poor bearer. Early. Imp.
- Hallihan. Medium, obtuse conical; dark scarlet; sub-acid; vigorous; productive.
- Hampden. Medium, obconical; light scarlet; moderately firm; good; late.
- Hart's Minnesota. Large, round; rich dark red; of fine flavor. Early. A moderate bearer, succeeds well in some places and fails in others. Per.
- Hathaway. Large, roundish oblong, deep scarlet; flavor rich, acid. Plant vigorous and productive. Michigan. Per.
- Hautbois, p. 448.
- Haverland, p. 608.
- Henry Ward Beecher. Medium, irregular; dark crimson; fine; early. Per.
- Hervey Davis. Hardy, vigorous, productive; of good quality. Massachusetts. Per.
- Hilton Gem. Medium, regular conical; light crimson; firm; juicy; good. Per.
- Hoffman, p. 605.
- Hooker. Large, broadly conical, regular, large specimens coxcomb-shaped; dark crimson; rather tender, juicy, with a fine rich flavor. An excellent sort, but rather tender, requiring winter covering, and for this reason is passing out of cultivation. Per.
- Hooper's Seedling. Medium,

- conical, deep crimson; rich, sweet. English.
- Hovey's Seedling, p. 608.
- Huddleston Favorite. Large; soft. Late, productive. Imp.
- Hudson. Rather large, ovate, usually with a neck, often without, dark rich red; flesh firm, of a high brisk acid flavor, requiring full maturity to be fine. Rather late. Profusely productive. Formerly the great market variety of Cincinnati; now nearly superseded. Valuable for preserving. Imp.
- Hudson's Bay. See Hudson.
- Huntsman. Large, roundish, scarlet; poor.
- Ida. Medium or smallish, nearly round, dark red; flesh firm, slightly acid, good in flavor—quite early and continues till late. Plant vigorous, productive. Fruit-stalks long and erect. Imp.
- Ideal. Large, heart-shaped; dark scarlet; flesh red. Per.
- Indiana. Large, regular; light crimson; good in quality. A strong grower. A seedling of the Charles Downing. Per.
- Iowa. Rather large, roundish, light orange scarlet; tender, juicy, very acid. Early. Hardy and vigorous. Western. Per.
- Iowa Beauty. Large, round conical, glossy scarlet.
- James Vick, p. 605.
- Jenny Lind.* Medium, conical, rich glossy crimson; firm, juicy, rich sub-acid. Mass. Old. Per.
- Jenny's Seedling. Large, roundish-conical; dark rich red; firm, rich, sprightly sub-acid. Excellent for preserving. Late. Hardy. Imp.
- Jersey Queen, p. 608.
- Jessie, p. 605.
- Jewell, p. 608.
- Jucunda, p. 605.
- Jucunda Improved, p. 606.
- Keen's Pistillate. Medium, conical, dark red; acid, sprightly. English.
- Keen's Seedling. Large, roundish-oblate, often coxcomb-shaped; shining, dark purplish-scarlet; firm, rich, high flavored. Rather early. Of the highest reputation in England, but tender, unproductive, and nearly valueless here. Per.
- Kentucky. Large, roundish-conical, dark red; moderately firm; slightly acid, rich; good. Plant vigorous, with strong fruit-stalks; productive. Valuable for its lateness. Per.
- Kirkwood. See Sharpless.
- Kitley's Goliath. See Goliath.
- La Constante. Large, handsome, crimson; juicy, sweet, high flavored. A fine strawberry, but of moderate productiveness, and not adapted to general cultivation. Per.
- Ladies' Pine. Small, round, pale red; excellent. Canada. Pistillate.
- Lady Finger. See Belle.
- Lady Thompson, p. 606.

- Large Early Scarlet. Medium, roundish-ovate, regular; bright scarlet; tender, rich, excellent. Very early. Productive at the North. Old. Per.
- Late Prolific. Medium, scarlet. Good, productive. Late.
- Leader, p. 606.
- Le Baron. Large, obtuse conic, dark scarlet; sweet, rich, melting. Productive. L. I. Little known. Per.
- Lennig's White, p. 606.
- Lida. Medium, wedge-shaped; dark crimson; heavy cropper; good shipper. Imp.
- Lincoln. Very large, irregular; dark color; rich, sweet. Season medium. A feeble grower, requiring high culture. Per.
- Lizzie Randolph. Medium, roundish, crimson; poor flavor.
- Logan, p. 606.
- Longfellow. Large, long conical, necked; handsome; of medium quality and moderately productive. Kentucky. Per.
- Longworth's Prolific.* Large, roundish, broad at base; light crimson; flesh scarlet, firm, rich, brisk, acid. Vines vigorous, productive. Cincinnati. Valuable at the South and West. Old. Per.
- Lovet, p. 606.
- Maggie. Large, ovate, pointed; dull scarlet; rather soft. Vigorous and productive. Per.
- Mammoth. Large, roundish, crimson. Poor, unproductive. English.
- Mammoth Bush. Medium in size; firm, of poor flavor. Forms but few runners, and is profusely productive. Per.
- Manchester. Medium to large, rounded conical, regular; bright scarlet; quality medium. Rather late. Profusely productive. New Jersey. Imp.
- Margaret, p. 606.
- Marguerite. Large, long conic, pale scarlet; rather insipid, handsome, showy; feeble grower.
- Marshall, p. 606.
- Marvin. Large; dark red; firm, of high flavor. Requires high culture, often fails. One of the latest of strawberries. Per.
- Mary, p. 606.
- Marylandica. Large, dark crimson; firm. Staminate. Md.
- Matilda. Large, conical, uniform, scarlet, firm—of excellent quality. Plant a strong grower, and very productive. New. Ulster Co., N. Y. Per.
- McAvoy's Extra Red. Large, irregularly oblate, generally necked; color deep scarlet; tender, juicy, acid, not rich. Excellent for preserving. Cincinnati. Imp.
- McAvoy's Superior. Large, roundish-oblate, more or less necked; light crimson becoming deep crimson; flesh scarlet, tender, juicy, very rich, vinous. Tender, and will not bear long carriage. Medium season. Hardy, vigorous, and productive. Ohio. Old. Imp.
- Mead's Seedling. Medium, long, conical; good. N. J.

Meek, p. 606.

Melon. Medium, round, dark; worthless. Scotch.

Metcalf's Early. Small, roundish; scarlet; mild acid. Michigan.

Methven Scarlet. Large, roundish, dull scarlet; soft, of poor flavor; discarded. English.

Miami. Large, round conical, slight neck; bright, firm, hollow; early.

Michigan. A seedling of the Wilson, ten days later.

Mineola. Medium, double points; neck pronounced; uneven; dark; rather late.

Miner, p. 606.

Mitchel, p. 606.

Monarch of the West. Very large, bright red, showy, firm; of moderate quality. Very productive. N. J. Per.

Monitor. Quite large, roundish; bright scarlet; firm, good. Vigorous grower. Productive, and perhaps best of the three "Tribune Strawberries." Per.

Monroe Scarlet. Rather large, roundish; light scarlet; tender, juicy, of good flavor. Rochester, N. Y. Little known. Imp.

Montevideo Pine. Large, conical, late. Staminate. L. I.

Mottier's Seedling. Large; acid.

Moyamensing. Rather large, broadly conical; deep crimson; seeds numerous and deeply imbedded; flesh red, firm, acid. Passing out of favor. Phila. Imp.

Mrs. Cleveland, p. 606.

Mt. Vernon. See Shuckless.

Muskingum, p. 606.

Myatt's. See British Queen.

Myatt's Eliza. See Eliza.

Napoleon III. Large, irregular, conical, sometimes coxcombed, light scarlet; firm, of good quality. Mostly a poor bearer. Per.

Neck Pine. Large, with a slender neck; color light red; flesh nearly white, rather acid, of fine flavor. Very productive, early—much cultivated at Cincinnati in past years. Imp.

Neunan. (Neunan's Prolific.) Size medium or small; light scarlet; quality rather poor, dry. Largely cultivated in the vicinity of Charleston, S. C., for market. Per.

New Dominion. Medium in size; bright red; moderately firm. Vigorous, hardy, productive. Canada. Per.

New Jersey Scarlet. Medium, conical, necked, light scarlet; good. N. J.

Nicanor, p. 606.

Nick Ohmer, p. 606.

Nigh. (Nigh's Superb.) Large, long conical, necked; light scarlet; good. Imp.

Ohio Centennial. Large; light red. Per.

Old Hudson. See Hudson.

Old Iron Clad. See Phelps.

Old Pine. Medium, conical with a neck, scarlet, solid, juicy, rich. Old or Virginia Scarlet, the original wild strawberry of this country, is smaller, and

- three or four days later. Old. Per.
- Oliver Goldsmith. Obtusely conical, necked. Resembles Seth Boyden. Season medium. Ohio. Per.
- Omer Pacha. Large, roundish, bright red; solid, juicy, sweet. Strong and prolific. Foreign.
- Orange Prolific. Large, roundish, necked, crimson; acid. Rochester, N. Y.
- Oriole. Large; dark red running through the flesh. Early. Imp.
- Osceola. See Mitchel's Early.
- Parker Earle, p. 607.
- Peabody. Quite large, irregular conic and coxcombed; deep crimson; flesh firm, sweet, rich, excellent flavor. Too poor a bearer to be of value. S. C. Hardy at the North. Imp.
- Pearl. Medium, conical; bright scarlet; plant strong. Per.
- Pennsylvania. Rather large, —broadly conical; deep crimson, flesh red, rather firm, acid. Phila. Imp.
- Phelps (or Old Iron-clad). Large, irregular; dull in color; moderate in flavor. Vigorous and sometimes productive. Imp.
- Phillips' Seedling. Medium, irregular, deep crimson; flesh red, firm, sub-acid; vigorous; productive.
- Pioneer. Rather large, round, conical; good, sometimes poor. Requires high culture and cut runners; foliage sometimes fails in the hot sun. A moderate bearer. New Jersey. Per.
- Piper. (Piper's Seedling.) Large, round, regular; dark crimson; firm. Early. Very productive, a strong grower, and gives high promise in some places West. Illinois. Per.
- Porter's Seedling. Medium, bright red; quality fair only; very early. Per.
- President Lincoln. See Lincoln.
- President Wilder, p. 607.
- Primo. Large, conical, necked, irregular; dark scarlet; firm; rather late; quality moderate. Vigorous and productive. Newburg, N. Y. Per.
- Prince (or Durand's Superb). Large, ovate, necked; firm, rich, of excellent flavor. Plant vigorous. Late. New Jersey. Per.
- Prince Albert. Medium, conical, dark crimson; rich. Not productive. English.
- Prince of Orleans. Medium, roundish, dark. Poor bearer.
- Prince of Wales. Large, glossy red; solid, delicate, acid. English.
- Prince's Climax. Large, conical; bright scarlet; good. Productive. Plant vigorous. L. I. Little known. Imp.
- Prince's Magnate. Large, round, scarlet; rich. Productive, hardy, vigorous. L. I.
- Princess, p. 607.
- Princeton Chief, p. 544.
- Profuse Scarlet. Medium, scarlet. Productive.
- Pyramidal Chilian. Medium,

- conical, scarlet. Bears long.
N. J. rich, very good. Sometimes
very fine and productive.
Imp.
- Racster. See Beder Wood.
- Red Jacket. Large; bright
crimson; soft. Very early.
Productive.
- Richardson's Early. Medium,
conical, crimson; good. Early.
Unproductive.
- Richardson's Late. Large,
roundish, scarlet; sprightly;
good.
- Ridgeway, p. 607.
- Rio, p. 607.
- Rippawam. Large, round conical,
sometimes irregular; scarlet;
barely good. Moderately
productive.
- Rival Hudson (Burr's). Medium,
conical; deep crimson;
firm, brisk, sub-acid. Hardy
and productive. Columbus,
Ohio. Imp.
- Roseberry. Rather small, ovate,
scarlet. Poor bearer. English.
- Ross Phoenix. Large, usually
coxcombed or compressed,
dark red; flesh firm, of fair
flavor. Season medium. Sometimes
very productive, but usually
fails on heavy clay and
scorches on light gravel. An
uncertain variety. Now superseded.
Per.
- Ruby. Medium, ovate, bright
red; juicy, rich, excellent; not
very hardy. English.
- Russel.* (Russel's Seedling,
Russel's Prolific.) Very large,
roundish-conic, somewhat irregular,
slightly necked;
bright crimson; slightly acid,
- Sample, p. 609.
- Saunders. Large, round conical,
glossy crimson; flesh red;
vigorous, productive. Canada.
Per.
- Scarlet Cone. Large, conical;
bright scarlet, beautiful. Vigorous
and productive. Rochester,
N. Y. Little known. Imp.
- Scarlet Melting. Medium, conical,
scarlet; tender, not rich.
- Scarlet Nonpareil. Large,
roundish-conical, bright red;
rich, high flavor. English.
- Schiller. Medium, conical, dark
red; rich, sub-acid. Unproductive.
German.
- Scotch Runner. Small, oval;
scarlet; good.
- Scott's Seedling. Rather large,
elongated conic, regular; light
scarlet; flesh pale red, not very
juicy nor high flavored. Mass.
Superseded.
- Seneca Queen. Large, round
oblate; dark red; early; soft.
Very productive. Excellent for
home use. Seneca Chief is distinct,
and of little or no value.
Per.
- Seth Boyden (Boyden's No. 30),
p. 607. Per.
- Shaker's Seedling. See Austin
Seedling.
- Sharpless, p. 607.
- Shuckless, p. 607.
- Shuster's Gem, p. 609.
- Sir Charles Napier. Large,
roundish-coxcombed, scarlet;
musky. English.

- Sir Harry. Large, coxcombed, dark red; solid, juicy. English. scarlet; sweet, rich. Poor bearer.
- Southborough Seedling. Medium, ovate, conic, scarlet; firm; mild, rich. English.
- Splendid. Medium, globular, scarlet; rather soft; good. Per.
- Stinger's Seedling. (Union, *erroneously*.) Large, roundish-ovate or coxcomb-shaped; scarlet; stalk stiff. Penn. Per.
- Sucker State. Medium; firm. Plant vigorous, often productive. Rather late. Per.
- Swainstone's Seedling. Large, ovate, light glossy scarlet; very good. A poor bearer. English.
- Thompson's No. 9. See Rio.
- Timbrell, p. 609.
- Triomphe de Gand, p. 607.
- Triple Crown. Rather large, oval conical, necked; crimson; firm, rich, with high flavor. Irregular bearer. Season medium. Waterloo, N. Y. Per.
- Trollope's Victoria. See Victoria.
- True Chili. Large, ovate, red; flesh firm, sweet, of indifferent flavor. Late.
- Tubbs. Large, regular, deep crimson. Early, good shipper. Per.
- Turner. (Turner's Beauty.) Medium; very handsome; rather early; excellent in quality. Productive. Per.
- Union. See Victoria.
- Unique Scarlet. Large, light
- Victoria. (Trollope's Victoria, Union.) Very large, nearly round, regular; light red; flesh pale red, tender, moderately rich, juicy, sweet—often nearly flavorless. Plant hardy, moderately vigorous, not very productive. English. Per.
- Vineland. Rather large; vigorous, productive; rather acid, good. Resembles Kentucky, but darker. New Jersey. Per.
- Walker's Seedling. Rather large, regular, conic; deep glossy crimson, becoming maroon; flesh crimson, tender, juicy, with a fine, rich, brisk flavor. Handsome, excellent, productive. Roxbury, Mass. Per.
- Warfield, p. 609.
- Warren. Large, round conic; dark red, handsome; firm, good. Early. Plant vigorous, sometimes very productive, but uncertain at the North; best in the Southwest. Origin, Kentucky. Per.
- Washington. See Iowa.
- Western Queen. Rather large, roundish-conical; rich, glossy dark red; flesh firm, juicy, sub-acid, sprightly, agreeable. Cleveland, Ohio. Imp.
- Willey. Medium, roundish; deep crimson; firm, sprightly, acid—good for preserving. Resembles Hudson. Improves by hanging long. Imp.
- William Belt, p. 607.
- Wilmot's Superb. Large, round-

- | | |
|--|--|
| ish, scarlet; coarse, not rich.
English. | Yale, p. 608. |
| Wilson (Wilson's Albany), p.
607. | Yellow Chili. Very large, irreg-
ular, yellow with a brown
cheek; flesh very firm, rather
rich. |
| Wizard of the North. Rather
large, dull red; soft, not rich.
Scotch. | York River Scarlet. See Hudson. |
| Wolverton, p. 607. | Young's Seedling. See German-
town. |

WILD AND UNCLASSIFIED FRUITS.

- | | |
|---------------------------------------|---|
| Buffalo Berry, p. 611. | Japanese Wine Berry, p. 618. |
| | June Berry (Service Tree, May
Cherry), p. 614. |
| Eleagnus Longipes (Goumi), p.
610. | Medlars: |
| | Dutch, p. 616. |
| Huckleberries: | Nottingham, p. 616. |
| Bilberry, p. 614. | Monstrous, p. 616. |
| Black Huckleberry, p. 614. | Royal, p. 616. |
| Canada Blueberry, p. 614. | |
| Highbush Blueberry, p. 614. | Paw-paw, p. 616. |
| Highbush Huckleberry, p. 614. | |
| Low Blueberry, p. 614. | Strawberry Raspberry, p. 618. |

GLOSSARY OF THE MORE COMMON WORDS USED IN FRUIT CULTURE.

Acerb, sour, bitter, harsh.

Aculeate, armed with prickles.

Acuminate, drawn out to a point.

Acute, sharp, pointed, or angular.

Adventitious roots, roots put out from the stem, as with strawberries, dewberries, etc.

Alburnum, the woody layer through which the sap still circulates, as distinguished from heart-wood.

Alternate, one side and then the other.

Annual, a plant which germinates from seed, produces flowers and fruit, and dies the same season.

Anther, that part of the stamen which bears the pollen.

Apetalous, without a corolla.

Apex, that part of a fruit farthest from the stem.

Appressed, in close contact, but not united.

Awn, a bristle-like appendage.

Axil, the angle between the leaf and stem.

Axillary bud, a bud growing in the axil of a leaf. Axillary buds may remain dormant indefinitely; when they begin to grow they become terminal buds, that is, buds at the extreme end of growing branches.

Barbate, bearded.

Barbate, like a berry.

Bark, the protecting covering of the stem or trunk; it is formed of several layers of differing structure, and grows from the inside.

Base, lower end; that part of a fruit nearest the stem, or of a stalk or any part of a plant nearest its supporting part or root.

Basin, the hollow or depression at the apex or crown of a fruit, in which the calyx is situated.

Bast, the inner layer of the bark, commonly composed of long wood-cells.

Beaked, ending in a narrow tip or beak.

Berry, a fruit pulpy or juicy throughout.

Beurré, a buttery pear. The word is discarded by the American Pomological Society.

Bezi, a natural seedling; a wilding.

Biennial, a plant which germinates from seed one season, and produces flowers and fruit and dies the next.

Bifid, two-cleft.

Bifoliate, with two leaves.

Blade, the expanded portion of a leaf.

Bract, an altered leaf, from the axil of which the floral axes spring.

Border, an artificial bed of enriched earth.

Callus, the ring or swollen portion formed at the base of a cutting by the descending cambium.

Calville-shaped, much ribbed, as applied to apples.

Calyx, the outer or green leaves of a flower, which, remaining on the apex of a pear or apple, are often called the eye.

Cambium, or *cambium layer*, the soft, usually mucilaginous, layer of newly forming wood beneath the bark.

Canes, long bearing shoots, usually applied to such berry-producing plants as grapes, raspberries, blackberries, etc.

Canescent, grayish-white, hoary.

Capitate, head-like.

Capsule, a dry seed-vessel, which splits open in a regular manner.

Carpel, a simple pistil or one division of a compound pistil.

Caruncle, an excrescence at the scar of some seeds.

Catkin, a form of inflorescence in which the flowers are incomplete.

Caudate, tailed.

Cavity.

Chlorophyll, the green coloring-matter of plants.

Clipping, trimming down to a definite shape.

Cockscomb, applied to strawberries when much compressed at the sides.

Colmar-shaped, pyriform or pear-shaped, having a slender neck and large body.

Cordate, heart-shaped.

Coriaceous, leathery.

Corolla, the inner floral envelope; it is usually colored; its separate leaflets are the petals.

Cortex, the bark.

Corymb, a flat or convex flower-cluster, as in cherries.

Crenate, notched or cut like blunt saw-teeth.

Cross, a fruit produced by fertilizing the flowers of one variety with the pollen of another; a hybrid.

Crown, the part of a fruit farthest from the stem; the apex.

Cuttings, shoots of one year's growth, inserted in the soil for multiplying varieties.

Cyme, a flat-tipped flower-cluster, differing from a corymb in its formation.

Deciduous, falling off—as leaves which fall in the autumn.

Dehiscent (fruits), opening at maturity.

Dentate, toothed.

Depressed, flattened vertically.

Diœcious, plants which have staminate and pistillate flowers on different individuals.

Drupe, a stone-fruit.

Duramen, heart-wood.

Dwarfs, trees made diminutive by grafting or budding upon stocks of small growth.

Echinate, armed with prickles.

Emarginate, notched at the apex.

Embryo, the germ or rudimentary plantlet in the seed.

Endocarp, the inner layer of the pericarp.

Endogenous, without the destination of bark, wood, and pith.

Enquenouille, training to produce fruitfulness by tying the branches downward.

Epicarp, the outer layer of the pericarp.

Epidermis, the outer covering, or skin.

Espalier, a tree trained flat upon a trellis.

Exogenous, having bark, wood, and pith, each distinct from the other.

Fascicle, a close cluster.

Fascicled roots, those which grow in a bunch or cluster.

Fibrous roots, the smaller branching thread-like roots.

Filament, the part of the stamen which supports the anther.

Flavescent, yellowish, or turning yellow.

Foliaceous, leaf-like.

Forcing, the early ripening of fruits under glass.

Fore-right shoot, the terminal shoot of a branch.

Germ, the rudimentary plantlet in the seed.

Glabrous, smooth.

Glaucous, covered with bloom, a fine white powdery coating which rubs off, as the bloom of the grape.

Habitat, the situation in which a plant grows naturally, without cultivation.

Head back, to cut off the limbs of a tree part way down.

Head down, to cut off the entire limbs or branches of a tree, or to cut down to an inserted bud.

Heeling in, burying the roots of a tree in a trench temporarily.

Indehiscent, fruit not opening at maturity.

Inflorescence, the arrangement in which flowers are produced.

Involucre, a whorl of bracts about the base of a single flower; an umbel or head.

Joint, that part of a stem from which a leaf or leaves spring; a node.

Kernel, the seed or edible substance enclosed in a shell or nut.

Laverginous, cottony or woolly.

Layers, side-shoots bent down and buried in the middle in the soil to take root.

Lay in, selecting and fastening new branches or shoots to a wall or trellis.

Lay in by the heels, to bury the roots of trees temporarily in a trench.

Leading shoot, the longest or main shoot of a tree.

Liber, the inner fibrous bark of exogenous plants.

Linear, narrow and flat.

Lobe, a prominent division, as of a leaf.

Lopping, cutting branches down to the main stem.

Maiden plant, a tree of one year's growth from the bud or graft.

Mesocarp, the middle layer of the pericarp.

Monœcious, a plant with staminate and pistillate flowers on the same individual.

Naked, destitute of both calyx and corolla.

Node, that part of the stem from which a leaf or leaves spring.

Nut, a dry indehiscent fruit having a woody or bony shell.

Oblate, flattened, so that the least diameter is between the base and apex.

Oblong, when the length exceeds the width and the sides are nearly parallel.

Obovate, largest toward the apex or crown.

Obtuse, rounded or blunt, wide angle.

Ovate, egg-shaped, largest toward the stem.

Panicle, a compound raceme.

Peduncle, the flower or fruit stalk; the stem.

Perennial, a plant which lives several or many years.

Perfect, a flower which has both stamens and pistils.

Perianth, the floral envelopes.

Pericarp, the matured ovary or seed-vessel.

Petals, flower-leaves, usually colored.

Petiole, stem of a leaf.

Pilose, hairy.

Pinch in, to stop the growth of a shoot by pinching off the tip.

Pistil, the organ in a flower which is fertilized and bears the seed.

Pippin, an indefinite term applied to various apples differing in size, shape, color, and flavor.

Pistillate, flowers with pistils, but without stamens.

Pith, the central mass of cellular tissue of exogenous stems.

Pollen, the fertilizing powder or element of flowers.

Pome, the apple, pear, and similar fruits.

Pomology, the science of fruits.

Primary roots, roots growing directly from the seed, as the tap-root.

Prostrate stem, one which lies flat on the ground.

Pubescent, hairy.

Punctated, dotted.

Pyramidal, like a pyramid, longer than conical.

Pyriform, pear-shaped, having a more or less drawn-out neck.

Raceme, an inflorescence with nearly equal secondary axes along the primary one, as the currant and wild cherry.

Radical, proceeding from the root.

*Ring*ing, to remove a ring of bark around a branch or stem to prevent the descending of the sap.

Root, the descending axis of a plant.

Root hairs, elongated cells of microscopic size upon the surface of the younger fibrous roots; produced during the growing season in enormous numbers; absent in dormant plants.

Runcinate, coarsely saw-toothed.

Runner, a slender prostrate branch rooting at the end and joints.

Scabrous, rough to the touch.

Scandent, climbing.

Scape, a peduncle rising from the ground or near it.

Scion, a shoot of one year's growth, for propagation of varieties; a cutting.

Secondary roots, adventitious roots.

Sepals, the separate leaflets of the calyx.

Serrate, saw-toothed.

Shanking, a diseased shrivelling of the foot-stalks of grapes.

Shorten in, to cut off more or less of the outer part of shoots.

Sinuate, strongly wavy.

Spathe, a tract which enfolds an inflorescence.

Spine, a thorn.

Spongiole, the minute spongy extremity of a fibrous root.

Sport, an unusual departure in variation in a new seedling.

Spur, a short stubby shoot, bearing fruit-buds or fruit.

Standard, a fruit-tree not dwarfed nor trained to a wall or trellis.

Stigma, the part of the pistil on which the pollen is deposited.

Stock, a seedling tree, in which a bud is inserted or grafted.

Stone-fruit, a drupe; fruit having an outer fleshy portion enclosing a stone.

Stop, to pinch or cut off the point of a shoot, to prevent its further growth.

Strike, to emit roots.

Succulent, juicy.

Tap-root, the main descending root.

Tendrils, a modified branch or leaf used for climbing.

Terminal bud, the bud terminating the main stem or growing branch.

Trellis, an upright flat frame, for training fruit-trees or grape vines upon its face.

Wildling, a natural seedling.

Work, a term applied to the budding or grafting of trees.

GENERAL INDEX.

- Agricultural experiment stations, 272
act establishing, 273
- Annular budding, 45
- Anthracnose, 234
- Aphis, apple, 170
black peach, 191
cherry, 196
peach, 191
woolly, 162
- Apples, 287
age of fruiting, 295
changes wrought by climate and soil, 294
characteristics of, 297
comparison of size, 298
cultivation of, 290
diseases of, 212
index of varieties, 689
nursery management of, 287
proper way to pick, 125
packing for market, 127
planting orchards, 289
renovating old orchards, 290
varieties, 297
I., summer, 298
II., autumn, 306
III., winter, 319
IV., crab, 348
- Apple-maggot, 176
- Apple-seed washer, 149
- Apple-tree tent caterpillar, 173
- Apple-trees, pruning young, 98
dwarf, 295
transplanting, 290
- Apple-worm, 177
- Apricot, the, 351
cultivation of, 351
diseases of, 229
index of varieties, 725
varieties of, 352
- Assorting fruit, 126
- Bagging grapes, 416
- Banana, the, 653
index of varieties, 726
propagation of, 653
- Bark, green, office of, 12
- Bark beetle, 195
lice, 165
- Barrels, presses for heading up, 128
- Black peach aphis, 191
- Blackberry, the, 356
covering the, 307
diseases of, 236
index of varieties, 726
pruning the, 356
varieties of, 357
- Black rot, 217
- Blight, fire, 218
- Bordeaux mixture, 215, 252
- Borer, flat-headed apple-tree, 165
peach-tree, 191
round-headed, 163
- Branches, the, 5
divisions of, 5
- Bud moth, 170
- Budding, annular, 45
knives, 29, 113
limits of, 45

- Budding, propagation by, 41
 - stages of, 42
 - terminal, 44
- Buds, adventitious, 7
 - lateral, 7
 - causes of difference in, 6
 - flower, 6
 - kinds of, 6
 - latent, 7
 - leaf, 6
 - terminal, 7
- Buffalo berry, 610
- Cambium layer, 5, 10
- Canker-worm, 171
 - wire trap for, 172
- Caprification of the fig, 662
- Carbonic acid, decomposition of,
 - by growing plants, 9
- Caterpillar, forest tent, 174
 - apple-tree tent, 173
 - yellow-necked, 176
- Cells of plants, 3
- Cherry, the, 362
 - aphis, 196
 - budding the, 363
 - dwarf, 364
 - grafting the, 363
 - index of varieties, 728
 - maggot, 196
 - net screens for, 265
 - propagation of, 363
 - pruning the, 109
 - slug, 182
 - soil for, 364
 - varieties of, 366
 - I., fruit heart-shaped, 366
 - II., fruit round, 375
 - III., native dwarf, 380
- Chestnuts, 439
 - varieties of, 442
- Chinquapin, the, 444
- Circle of fruits, 145
- Citron, the, 649
 - varieties of, 649
 - index of varieties, 734
- Citrus fruits, 621
 - diseases of, 637
 - insects affecting, 635
 - propagation from cuttings and layers, 628
- Cleft-grafting, 33
- Codling-moth, 177
- Collar, 4
- Constriction, effects of, 10
- Corn-knife, 59
- Crab apples, varieties of, 348
- Cranberry, the, 382
 - cultivation of, 383
 - diseases of, 240
 - gathering the, 384
 - index of varieties, 734
 - soil for, 383
 - varieties of, 384
- Crops in orchards, 81
- Cross-impregnation, 18
- Cultivation of the soil, 77
 - arrangements to facilitate, 84
- Curculio, 185
 - quince, 196
 - remedies for, 188
- Curl of the leaf, in peach, 227
- Currant, the, 386
 - borer, 201
 - bushes, improving old, 388
 - diseases of, 237
 - index of varieties, 734
 - locations adapted for, 387
 - propagation of, 386
 - pruning the, 387
 - span-worm, 203
 - varieties of, 388
 - I., red and white, 388
 - II., black, 391
 - worm, imported, 202
 - native, 201
- Cuttings, propagation by, 24

- Date, the, 655
 propagation of, 655
 Destructive insects, 160
 Dewberry, the, 356
 Dibble, the, 152
 Dieback, 638
 Diseases of fruits, 211
 anthracnose, 234
 black knot, 230
 black rot, 217
 brown rot, 217
 fire-blight, 218
 leaf-blight, 220
 mildew, 233
 peach, curl of the leaf, 227
 pear scab, 222
 ripe rot, 216
 root galls, 240
 rust, 212
 scab, 214
 yellows of peach, 224
 Distances for planting, 75
 Dwarf cherries, 364
 stocks for, 364
 nets for, 365
 Dwarf pear-trees, 493
 pruning, 496
 varieties of, 494

 Eleagnus longipes, 610
 Enclosures, varieties of, 54
 Espalier training, for peach, 470

 Fertilizers for orchards, 88
 Fig, the, 658
 budding the, 661
 caprification of, 662
 cultivation of, 662
 drying the, 663
 grafting the, 661
 index of varieties, 736
 propagation of, 660
 pruning the, 662
 Fig, soil for, 660
 varieties of, 663
 Flea-beetle, grape-vine, 197
 Flowers, fertile, 14
 parts of, 13
 pistillate, 14
 staminate, 14
 sterile, 14
 Forbidden fruit. See *Shaddock*.
 Form of trees, giving desired, by pruning, 95
 Frost, destroys peach crop, 465
 effect on the orange, 633
 Fruit, houses for storing, 135
 how to obtain quickly, 144
 keeping, 133
 terms used in describing, 260
 to supply a family, 140
 Fruit-boxes, piling, 137
 storing, 137
 Fruitfulness, pruning as affecting, 94
 Fruit-garden, plan of, 141
 Fruit-pickers, 114
 Fruit-pilferers, 54
 Fruit-room, plans for, 135
 Fruit-tree ladders, 116

 Garden reel, 116
 spray pump, 118
 syringes, 118
 Gathering fruit, 123
 Germination, 1
 air in, 2
 how produced, 2
 moisture in, 2
 requisites for, 1
 Girdled trees, to repair, 47
 Gooseberry, the, 393
 diseases of, 237
 index of varieties, 736
 varieties of, 393
 I., European, 393
 II., American, 395

- Gouger, plum, 191
- Grafting, chisel for, 28
- cleft, 33
 - cleft sap, 438
 - knife for, 29
 - limits of, 45
 - modification of, 47
 - prong, 437
 - propagation by, 27
 - requisites for, 28
 - root, 37
 - saddle, 34
 - tongue, 33
 - veneer, 35
 - whip, 33
- Grafting-wax, how made, 29
- Grafts, care of, 32
- cutting, 30
 - dry, to restore, 33
 - packing, 31
- Grape, the, 398
- bagging the, 416
 - cross-impregnation of, 19
 - diseases of, 233
 - distances for planting, 418
 - grafting in open ground, 406
 - index of varieties, 737
 - keeping the, 138
 - layering the, 399
 - mode of pruning, 412
 - modifications of training, 415
 - packing for market, 129
 - phylloxera, 196
 - propagation of, 399
 - from cuttings, 402
 - from green cuttings, 405
 - from layers, 399
 - from single buds, 403
 - pruning the, 412
 - raising from seed, 418
 - root grafting, 405
 - spraying the, 257, 416
 - summer pinching of, 414
- Grape, training the, 406
- transplanting the, 407
 - trellis for, 408
 - varieties of, 419
- Grape-vine flea-beetle, 197
- leaf-hopper, 200
- Grape-vines, soil for, 417
- Growth of trees, 1
- process of, 8
- Grub, white, 205
- Guava, the, 665
- propagation of, 666
- Hazelnuts, 444
- harvesting, 446
 - marketing, 446
 - propagation of, 445
 - varieties of, 447
- Hedge, hook for trimming, 59
- Hedge-shears, 59
- Hedges, evergreen, 55
- Osage orange, 55
 - to prune properly, 57
- Heeling-in trees, 72
- Hickory nuts, 449
- Hook to trim hedges, 59
- Houses for storing fruit, 135
- Huckleberries, 612
- Hybrids, definition of, 21
- Implements used by fruit growers, 112
- budding-knives, 113
 - folding ladder, 117
 - fruit pickers, 115
 - fruit-tree ladders, 116
 - garden reel, 116
 - garden spray pump, 118
 - garden syringes, 118
 - grafting chisel, 114
 - pointed ladder, 116
 - pruning-knives, 91, 112
 - pruning-saws, 113
 - pruning-shears, 114
 - tree-scraper, 117

- Implements used by fruit grow-
 ers, tree-tags, 119-121
 vine scissors, 116
 Insects, destructive, 160
 and diseases, 160
 affecting citrus fruits, 635
 how they eat, 160
 Japanese wineberry, 618
 Juneberry, 614
 Keeping fruit, rules for, 139
 Ladder, folding, 117
 fruit-tree, 116
 pointed, 116
 Lakes and rivers, influence of, 53
 Layer, cambium, 5
 cortical, 5
 Layers, propagation by, 26
 Leaf-blight in pears, 220
 Leaf-hopper, grape-vine, 200
 Leaves, composition of, 7
 necessity of, 12
 pores of, 8
 Lecanium scale, 169
 Lemon, the, 646
 cultivating the, 646
 diseases of the, 637
 index of varieties, 742
 marketing the, 647
 varieties of, 647
 Limb-blight, in citrus fruits, 637
 Lime, the, 651
 index of varieties, 743
 propagation of, 652
 varieties of, 652
 Loquat, the, 667
 propagation of, 668
 varieties of, 668
 Mal de goma, 637
 Management of nurseries, 147
 Manures, 50
 Manuring, faulty, 82
 when necessary, 83
 Medlars, 615
 Mice, damage by, 293
 Mildew, 233
 Moisture, exhalation of, 11
 Mulberry, the, 428
 index of varieties, 743
 varieties of, 429
 propagation of, 429
 Mulching, 70
 Nectarine, the, 431
 index of varieties, 743
 varieties of, 431
 Nests, wooden, for small fruit,
 132
 Net screens for cherries, 365
 Nurseries, management of, 147
 Nursery: budding and grafting,
 153
 cultivation of, 153
 laying out, 148
 lifting trees, 155
 seeds and stocks for, 148
 shelter for, 148
 soil for, 147
 trees, pruning, 96
 Nuts, 434
 chestnuts, 439
 chinquapin, 444
 cleft-sap grafting of, 438
 hazelnuts, 444
 hickories, 449
 index of varieties, 745
 pecan, 449
 prong-grafting of, 437
 propagation of, 435
 shellbark hickories, 454
 walnuts, 456
 Orange, the, 621
 budding the, 624
 cultivation of, 631
 cuttings and layers of, 628
 diseases of, 637

- Orange, distance of planting, 630
 dwarfing the, 626
 evolution of the, 622
 fertilizers for, 629
 frost, effects of, 633
 grafting the, 624
 index of varieties, 746
 insects injurious to, 635
 marketing the, 647
 propagation of the, 623
 protection against frost, 634
 pruning the, 632
 seedlings, 623
 selection of varieties, 640
 soil for, 628
 stocks for, 625
 transplanting the, 626
 varieties of, 641
- Orchards, cultivation of commercial, 85
 fertilizers for, 88
 laying out, 61
 management of Western, 83
 manuring, 60
 preparing, 60
 registering, 76
 staking out, 62
 when to manure, 83
- Oyster-shell bark-louse, 165
- Packing fruit for market, 126
- Paw-paw, 616
- Peach, the, 464
 aphid, black, 191
 borer, 191
 crop, destruction of, by frost, 465
 diseases of, 224
 espalier training, 470
 index of varieties, 747
 manures for, 469
 propagation of the, 646
 pruning the, 106
 raising in pots, 470
- Peach, soils for, 468
 stocks for, 468
 training the, 469
 transplanting the, 469
 varieties of, 474
 I., freestones, 476
 II., clingstones, 488
 winter protection for, 473
 yellows, 224
- Pear, the, 491
 budding the, 493
 classification of forms, 501
 diseases of, 218
 dwarf, 493
 index of varieties, 757
 midge, 183
 propagation of, 491
 quality of, 510
 regrafting the, 498
 slug, 182
 training the, 497
 varieties of, 510
 I., summer pears, 510
 II., autumn pears, 515
 III., winter pears, 537
 wintering the seedlings, 492
- Pecan nuts, 449
 varieties of, 451
- Persimmon, the, 669
 cultivation of, 673
 diseases of, 673
 index of varieties, 782
 Japanese improvement of, 671
 varieties of, 669, 674
- Phylloxera, grape, 196
- Picking apples, proper way of, 125
- Pineapple, the, 678
 cultivation of, 680
 diseases of, 683
 index of varieties, 782
 propagation of, 679
 soils for, 681

- Pineapple, varieties of, 684
 Pith, use of, 5
 Plant, cells of, 3
 structure of, 2
 Plum, the, 545
 classification of, 547
 cultivation of, 546
 curculio, 185
 diseases of, 230
 gouger, 190
 grafting and budding, 546
 index of varieties, 783
 propagation of, 545
 varieties of, 548
 American group, 548
 Chickasaw group, 551
 European group, 552
 Japanese group, 575
 Wild Goose group, 550
 Pointed ladder, 116
 Pomegranate, the, 686
 index of varieties, 793
 propagation of, 686
 varieties, 687
 Pores of leaves, 8
 Presses for heading-up apple-barrels, 128
 Process of vegetation, 1
 Prong-grafting, 437
 Propagation, 22
 by budding, 41
 by cuttings, 24
 by grafting, 27
 by layers, 26
 Pruning apple-orchards in bearing, 105
 as affecting fruitfulness, 94
 cherry-trees, 109
 giving desired form by, 95
 grape-vines, mode of, 412
 nursery and young trees, 96
 peach-trees, 106
 principles and practice of, 90
 proper time for, 93
 Pruning quince-trees, 110
 roots, 111
 single shoots, 96
 summer, 94
 tools for, 91, 106, 112
 tops, 90
 young apple-trees, 98
 Pruning-knives, forms of, 91, 112
 Pruning-shears, 114
 Psylla, the pear, 180
 Pummelo. See *Shaddock*.
 Pyramids, to train, 100
 Quince, the, 580
 curculio, 196
 diseases of, 223
 index of varieties, 793
 propagation of, 580
 pruning the, 110, 582
 rust, 223
 soil for, 582
 varieties of, 582
 Rabbits, damage by, 294
 Raspberry, the, 585
 cane-borer, 203
 classification, 589
 diseases of, 237
 index of varieties, 793
 planting for market, 587
 propagation of, 585
 raising from seed, 588
 rules for culture of, 588
 saw-fly, 204
 soil for, 585
 varieties of, 589
 I., European, 589
 II., American Black-caps, 592
 III., Native Red, 594
 Registering orchards, 76
 Renovating old trees, 82
 Requisites for germination, 1
 Root, collar of, 4
 galls, 240

- Root hairs, 4
 - main, 3
 - parts of, 3
 - tap, 3
- Root-grafting, 37
 - time for, 40
 - tools for, 37
- Rootlets, 4
- Roots and leaves, mutual relation between, 92
 - preparing for transplanting, 68
 - pruning the, 110
- Rose-bug, 199
- Rot, black, 217
 - brown, 217
- Rules for keeping fruit, 139
 - for naming and describing fruits, 283
- Rust, 212
- Saddle-grafting, 33
- San José scale, 167
- Sap, circulation of, 9, 23
 - flow of, 23
 - functions of, 9
 - grafting, cleft, 438
- Sap-grafting, 438
- Saw-fly, raspberry, 204
- Scab, 214
 - in citrus fruits, 639
- Scions, how to send by mail, 32
 - packing, 32
- Scurfy bark-louse, 167
- Seed, planting, 151
 - raising grapes from, 418
- Shaddock, the, 650
 - index of varieties, 796
 - varieties of, 651
- Shears, hedge, 59
- Shellbark hickory nuts, 454
- Single shoots, pruning, 96
- Sites, elevated, 52
- Situation, 51
- Slug, pear, 182
- Small fruits, packing for market, 131
- Snowy tree-cricket, 204
- Soil, cultivation of the, 77
 - qualities of, 49
 - for nursery, 147
 - for vineyards, 417
- Soils, management of, 50
- Species, definition of, 14
- Spray calendar, 255
- Spray pump, garden, 118
- Spraying, 242
 - apparatus for, 246
 - grapes, 416
 - materials for, 250
- Stem, the, 5
- Stiffening trees against wind, 68
- Storing fruit, houses for, 135
- Strawberry, the, 596
 - crown borer, 207
 - cultivation of the, 598
 - diseases of, 239
 - early, 600
 - leaf-roller, 208
 - garden culture of, 600
 - index of varieties, 796
 - packing for market, 131
 - perfect and imperfect flowers, 601
 - root-louse, 206
 - rules for setting out, 600
 - runners, 599
 - selection of varieties, 601
 - soil for, 596
 - staminate and pistillate sorts, 601
 - weevil, 209
 - transplanting, 596
 - varieties of, 603
 - I., flowers perfect, 604
 - II., flowers imperfect, 608
- Strawberry-raspberry, 618
- Structure of plants, 2

- Structure of trees, 2
- Subtropical fruits, 621
- Suckers, definition of, 27
- Summer pinching for grapes, 414
 - pruning, 90
- Sunlight necessary for growth, 9
- Surface, transplanting on the, 69
- Syringes, garden, 118
- Tags, tree, 119
- Tap-root, 3
- Tent-caterpillar, 173
- Terminal budding, 44
- Terms used in describing fruits, 260
- Thinning fruit, 122
- Thinning-back hedges, 56
- Thomery system of training grapes, 415
- Time for pruning, proper, 93
- Tongue-grafting, 33
- Training grape-vines, 406
 - modifications of, 410
- Tree, structure of, 2
 - trunk, cross-section of, 3
- Transplanting, 63
 - on the surface, 69
 - preparing the roots, 68
 - pruning for, 66
 - pruning young trees at time of, 90
 - requisites for, 73
 - season for, 71
 - stiffening against wind, 68
 - setting the tree, 68
 - strawberry plants, instrument for, 598
- Transportation, packing trees for, 155
- Tree-scraper, 117
- Tree-tags, 119
- Trees, belts of, for wind-breaks, 54
 - distances for planting, 74
 - dwarf, 102
 - fail on "treed" land, 159
 - growth of, 1, 260
 - heeling-in, 72
 - number required for an acre, 76
 - packing for transportation, 155
 - received from a distance, 71
 - renovating old, 82
 - saving mice-gnawed, 47
 - transplanting, 63
- Trellis for grape-vines, 408
 - training vines on, 410
 - size of wire for, 410
- Valleys, cold in, 52
- Varieties, crossing, 17, 19
 - definition of, 14
 - new, production of, 16
- Vegetation, process of, 1
- Veneer grafting, 35
- Vineyards, soil for, 417
- Water, amount needed by growing plants, 11
- Water, when necessary, 70
- Walnuts, 456
 - black walnut, 458
 - butternut, 457
 - Persian, 458
 - varieties of, 459
- Whip-grafting, 33
- White grub, 205
- Wild and unclassified fruits, 610
 - index of varieties, 808
- Wire for grape trellis, 410
- Wood, alburnum or sap, 5
 - heart, 5
- Yellow-necked apple-tree caterpillar, 176
- Yellows of peach, 224

- 2 1/2 inches by the firm support group
8 Bostell - 2 - " on first line
1 English Walnut
1 Japanese
1 English

Garden
Gate

Graveston
○

○ Baldwin

Graveston
○

○ Baldwin

Red
Astrocham
○

○ Faneuse

Red
Astrocham
○

○ Faneuse

○ Faneuse

○ Faneuse

Woolly
○

○ Wealthy

Northern
Spuff
○

○ Duchess of Aldenburg

○ McIntosh

Standard
○
Bartlett

○ McIntosh

○
McIntosh Red

○ Duchess

○ Duchess

Wilder's
Early

○ Seckel

○ Seckel

○ Laurence

○ Laurence

○ Laurence
Rijou

Standard
Beurre Bore

Standard
Beurre
Bore.

○
Mulbury

Sheldon
Pear

Cotes Orange

Mc Intosh Red

Canense

Mildred
Early

Hubbardston

Hubbardston

Anjou

Duchess of
Oldenburg

Anjou

Wolf River

Blackberron

Wolf River

Seckel

Wealthy

Seckel

King

Pine
Tree

King

Raja's Early

Yellow Transparent

Raja's Early

R. V. Greening

Raja's Early

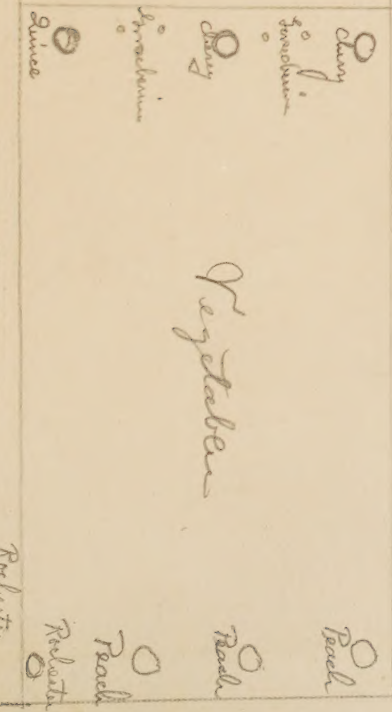
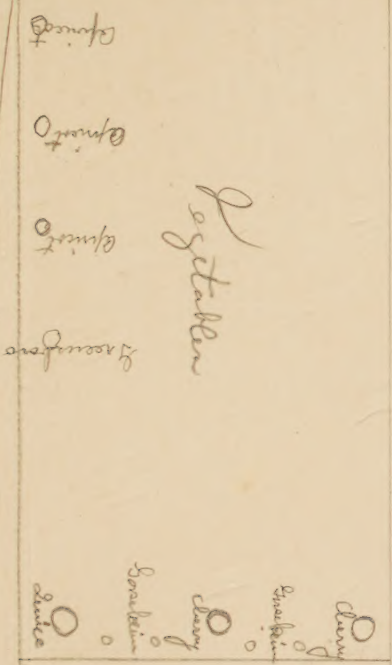
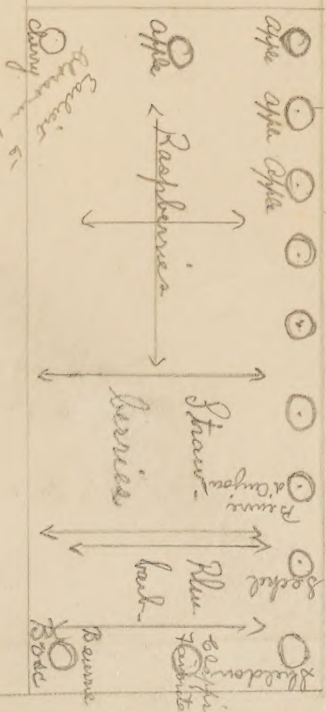
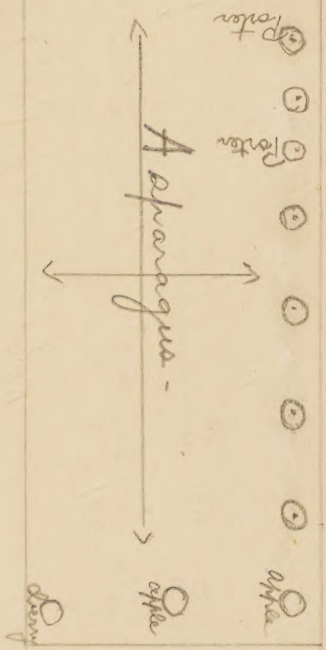
William's Favorite

Barnum

Clapp's Favorite

Bartlett

Barnum
O v



Peaches -
 English
 French
 Spanish
 Italian
 Dutch
 German
 Russian
 Polish
 Czech
 Slovak
 Hungarian
 Romanian
 Bulgarian
 Serbian
 Croatian
 Slovenian
 Macedonian
 Montenegrin
 Bosnian
 Herzegovinian
 Albanian
 Greek
 Turkish
 Armenian
 Georgian
 Azerbaijani
 Uzbek
 Tajik
 Kyrgyz
 Kazakh
 Russian
 Polish
 Czech
 Slovak
 Hungarian
 Romanian
 Bulgarian
 Serbian
 Croatian
 Slovenian
 Macedonian
 Montenegrin
 Bosnian
 Herzegovinian
 Albanian
 Greek
 Turkish
 Armenian
 Georgian
 Azerbaijani
 Uzbek
 Tajik
 Kyrgyz
 Kazakh

